MBC05641
Bipolar Microstep Driver

User's Guide

ANAHEIM AUTOMATION
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MBC05641 Features

- Size (5.400”L x 1.868”W x 3.36”H)
- Output Current 5.0 Amps Peak
- 200 to 12,800 steps/rev (1, 2, 5, 10, 16, 32, and 64 selectable step operations)
- Short Circuit Protection
- No Minimum Inductance
- Optical Isolation
- Motor ON/OFF Input

General Description

The MBC05641 Microstep Motor Driver has an output current capability of 0.5 Amps minimum to 5.0 Amps maximum (Peak Rating). The MBC05641 driver operates from a DC voltage of 24-48 Volts. The inputs are optically isolated with a minimum sourcing of 7.0mA per input (+3.5VDC minimum to +24VDC maximum). The clock input is set to receive either positive or negative edge clocks with a maximum frequency of 400kHz. The MBC05641 driver offers direction control and motor current ON/OFF capabilities. The Reduce Current Enabled automatically reduces motor current to 50% of set value after the last step is made (1sec delay). The driver has built-in features to indicate power on (Green LED), clocks being received (Yellow LED), and fault conditions (Red LED).

With the MBC05641, various step resolutions can be implemented by the onboard dip switch. These divisions range from 200 steps per revolution to 12,800 steps per revolution. The bipolar drive configuration handles 4, 6 and 8 lead motors. Protection devices have been added to this driver for *Phase to Phase Short-Circuit* conditions.

Pin Descriptions

The inputs on the MBC05641 are optically isolated with the anode (+) and cathode (-) both brought out to the user. With no current going through the opto-diode the input is considered high. To enable the input a minimum of 7.0mA needs to be sourced or sinked through the opto-diode. This is done simply by placing a voltage of +3.5 to +24VDC across the two inputs of the opto-diode. If sourcing current into the inputs, then all three cathodes (-) should be tied together and grounded as shown in Figure 2. If sinking current, then all three anodes (+) should be tied together to the +voltage as shown in Figure 1. Provided on the MBC05641 is an external +5VDC out which can be used to power the inputs for sinking mode only. However, if you use this +5 voltage, isolation is not preserved.

TB2: 5 Pin - Motor Connection Terminal Description

Pin #	Description
1	**Phase A:** Phase 1 of the step motor
2	**Phase $\bar{A}$:** Phase 3 of the step motor
3	**Phase B:** Phase 2 of the step motor
4	**Phase $\bar{B}$:** Phase 4 of the step motor
5	**Motor Ground**

Table 1: TB2 Terminal Descriptions

TB1: 8 Pin - Input Signals Terminal Description

Pin #	Description
1	**Step Clock Input Anode (+):** A positive going edge on this isolated input advances the motor one increment. The size of the increment is dependent on the Microstep Select Inputs of Switch 1.
2	**Step Clock Input Cathode (-)**
3	**Direction Anode (+):** This isolated input is used to change the direction of the motor. Physical direction also depends on the connection of the motor windings.
4	**Direction Cathode (-)**
5	**ON/OFF Anode (+):** This isolated input is used enable and disable the output section of the driver. When HIGH (open) the outputs are enabled. However, this input does not inhibit the step clock.
6	**ON/OFF Cathode (-)**
7	**+5VDC:** This non-isolated output can be used to supply up to 50mA of current to the isolated inputs. By doing this, isolation will be disabled.
8	**0VDC:** +5VDC return.

Table 2: TB1 Terminal Descriptions

TB3: 3 Pin - Input Power Terminal Description

Pin #	Description
1	VIN (+24 to +48VDC)
2	0VDC
3	Earth Ground

Table 3: TB3 Terminal Descriptions

Optically Isolated Inputs

The following inputs to the MBC05641 are Optically Isolated.

Item	Pin #
Clock	1 & 2
Direction	3 & 4
On/Off	5 & 6

Table 4: Inputs that are Optically Isolated

To enable an input, apply a DC voltage source of +5VDC to +24VDC across the inputs. The Anodes (+) are pins 1, 3 and 5 and the Cathodes (-) are pins 2, 4 and 6.

Absolute Maximum Ratings

Input Voltage: 55VDC
Output Current: 5.0Amps Peak
Max Plate Temperature: 70°C
Storage Temperature: 0° to +50°C
Input Voltage (For isolated inputs): +3.5V to +24V

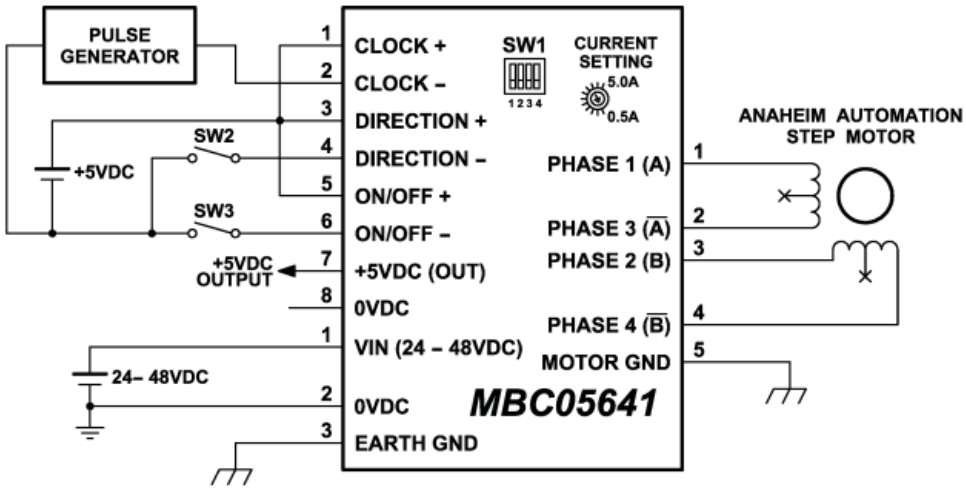
Electrical Specifications

Item	Min	Typ	Max	Units
Input Operating Voltage	20	48	55	VDC
Phase Output Current	0.7		3.5	A (RMS)
Phase Output Current	1.0		5.0	A (Peak)
Clock Frequency	0		400	kHz
Chopping Frequency	28	30	32	kHz
Input Signal Voltage	3.5		24	V
+5VDC Out	4.8	5	5.2	V
+5VDC Out	0		50	mA
Operating Temperature	0		70	C
Storage Temperature	0		50	C

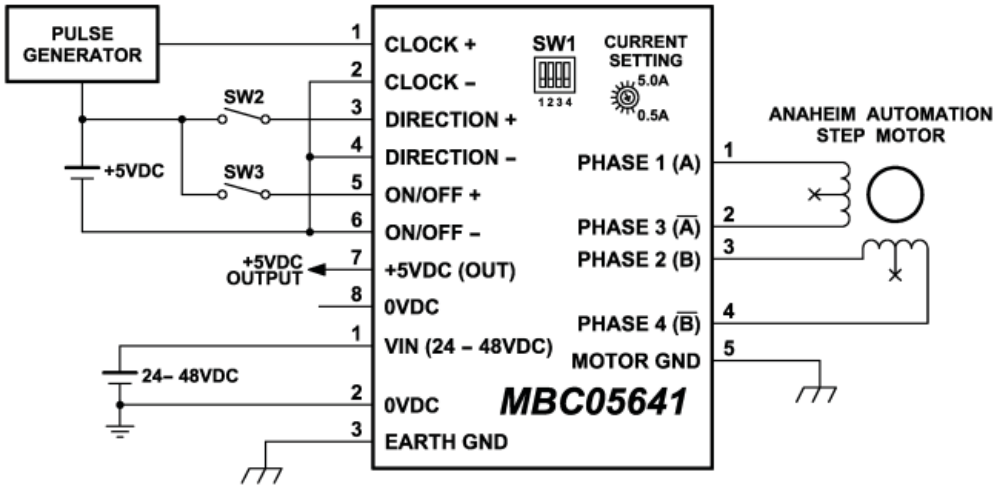
Table 5: Specifications

Wiring Diagrams

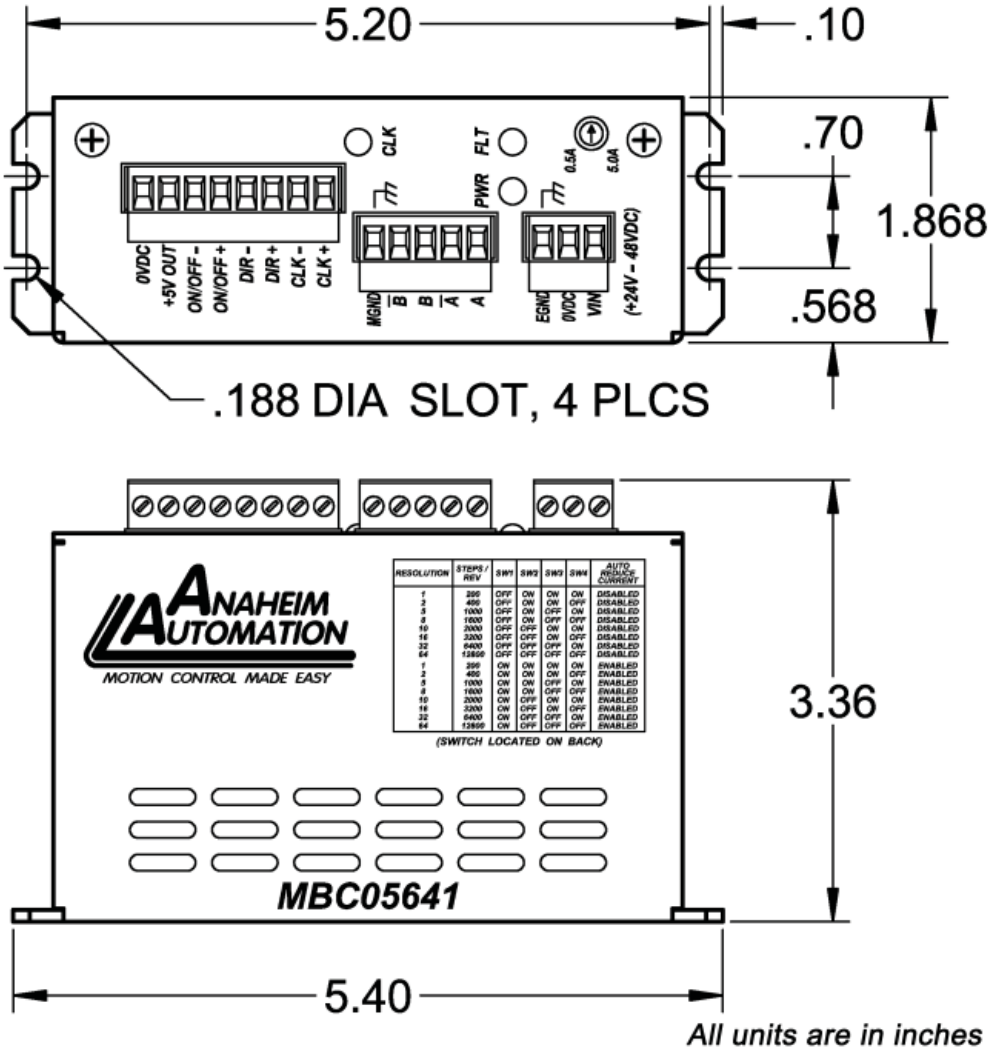
Sinking:



Sourcing:



Dimensions



Motor Selection

The MBC05641 is a Bipolar Microstep Driver that is compatible with both Bipolar and Unipolar Motor Configurations, (i.e. 8 and 4 lead motors, and 6 lead center tapped motors).

Step motors with low current ratings and high inductance will perform better at low speeds, providing higher low-end torque. Motors with high current ratings and low inductance will perform better at higher speeds, providing more high-end torque.

Since the MBC05641 uses a constant current source drive technique, it is not necessary to use a motor that is rated at the same voltage as the supply voltage. What is important is that the potentiometer is set to the appropriate current level based on the motor being used. Higher voltages will cause the current to flow faster through the motor coils. This in turn means higher step rates can be achieved. *Care should be taken not exceed the maximum voltage of the driver.*

Anaheim Automation offers a comprehensive line of step motors in 17, 23, 34 and 42 frame sizes. Contact the factory to verify motor/drive compatibility.

Step Motor Selection Guide

Part Number	Unipolar Rating	Series Peak Rating	Parallel Peak Rating	Series Current Setting	Parallel Current Setting
23Y206	3.0A	3.0A	6.0A	60%	100%
23Y210	5.0A	5.0A	10.0A	100%	100%
23Y306	3.0A	3.0A	6.0A	60%	100%
23Y310	5.0A	5.0A	10.0A	100%	100%
34Y108	4.0A	4.0A	8.0A	80%	100%
34Y207	3.5A	3.5A	7.0A	70%	100%
34Y307	3.5A	3.5A	7.0A	70%	100%
23Y108	4.0A	4.0A	8.0A	80%	100%
23Y106	3.0A	3.0A	6.0A	60%	100%
23Y104	2.0A	2.0A	4.0A	40%	80%
17Y302	---	1.0A	---	22%	---
17Y202	---	1.0A	---	22%	---
17Y102	---	1.0A	---	22%	---

Table 6: Step Motor Selection Guide

Anaheim Automation offers motor cable, making hook-ups quickly and easy!
Contact the factory or visit our website for more motor and cable offerings

Microstep Selection (SW1 Settings)

Switches 2, 3 and 4, of the DIP switch select the number of microsteps per step. The table below shows the standard resolution values along with the associated positions for the select switches. The standard waveforms are sinusoidal. Switch 1 selects the auto reduce current enable or disable. With Switch 1 On, reduce current is enabled, with Switch 1 Off, reduce current is disabled.

Resolution	Steps/Rev	Select 2	Select 3	Select 4
1	200	ON	ON	ON
2	400	ON	ON	OFF
5	1000	ON	OFF	ON
8	1600	ON	OFF	OFF
10	2000	OFF	ON	ON
16	3200	OFF	ON	OFF
32	6400	OFF	OFF	ON
64	12800	OFF	OFF	OFF

Table 7: SW1 Switch Settings

Setting the Output Current

The output current on the MBC05641 is set by an onboard potentiometer. This potentiometer determines the per phase peak output current of the driver. The relationship between the output current and the potentiometer value is as follows:

Peak Current	Potentiometer Setting	Peak Current	Potentiometer Setting
0.5A	0%	3.0A	60%
0.6A	10%	3.5A	70%
0.9A	20%	4.0A	80%
1.5A	30%	4.5A	90%
2.0A	40%	5.0A	100%
2.5A	50%	--	--

Table 8: Output Current POT Settings

Refer to Table 6 for specific motor current settings.

Reducing Output Current

Reducing the output current is accomplished by setting switch 1 of the DIP switch to the ON position and occurs approximately 1sec after the last positive going edge of the step clock input. The amount of current per phase in the reduction mode is approximately 50% of the set current. When the current reduction circuit is activated, the current reduction resistor is paralleled with the current adjustment potentiometer. This lowers the total resistance value, and thus lowers the per phase output current.

Determine Output Current

The output current for the motor used when microstepping is determined differently from that of a full/half step unipolar driver. In the MBC05641, a sine/cosine output function is used in rotating the motor. The output current for a given motor is determined by the motors current rating and the wiring configuration of the motor. There is a current adjustment potentiometer used to set the output current of the MBC05641. This sets the peak output current of the sine/cosine waves. The specified motor current (which is the unipolar value) is multiplied by a factor of 1.0, 1.4, or 2.0 depending on the motor configuration (series, half-coil, or parallel).

Step Motor Configurations

Step motors can be configured as 4, 6, or 8 leads. Each configuration requires different currents. Refer to the lead configurations and the procedures detail above to determine their output current.

WARNING! Step motors will run hot even when configured correctly. Damage may occur to the motor if a higher than specified current is used. Most specified motor currents are maximum values. Care should be taken to not exceed these ratings.

6 Lead Motors

When configuring a 6 lead motor in a **half-coil configuration** (connected from one end of the coil to the center tap), multiply the specified per Phase (or unipolar) current rating by 1.4 to determine the current setting potentiometer value. This configuration will provide more torque at higher speeds when compared to the series configuration.

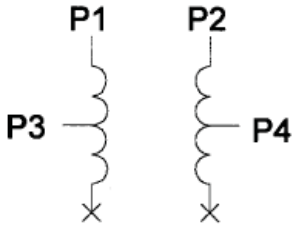


Figure 4: Half Coil Motor Connection

When configuring the motor in a **series configuration** (connected from end to end with the center tap floating) use the specified per Phase (or unipolar) current rating to determine the current setting potentiometer value.

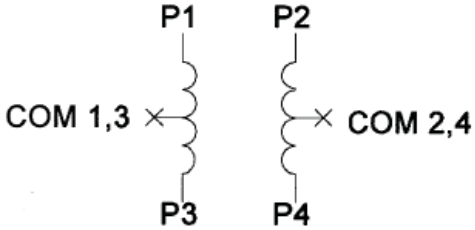


Figure 5: Series Motor Connection

4 Lead Motors

Multiply the specified **series** motor current by 1.4 to determine the current adjustment potentiometer value. Four Lead Motors are usually rated with their appropriate series current, as opposed to the *Phase Current,* which is the rating for 6 and 8 lead motors.

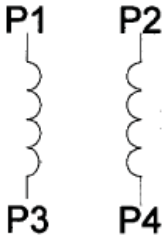


Figure 6: Series Motor Connection

8 Lead Motors

Series Connection: When configuring the motor windings in series, use the per Phase (or unipolar) current rating to determine the current setting potentiometer value.

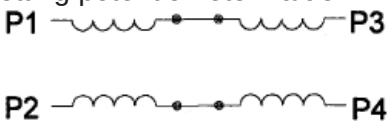


Figure 7: Series Motor Connection

Parallel Connection: When configuring the motor windings in parallel, multiply the per Phase (or unipolar) current rating by 2.0 to determine the current setting potentiometer value.

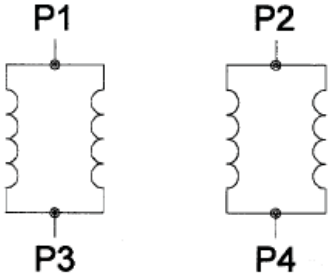


Figure 8: Parallel Motor Connection

Note: After the current has been determined, according to the motor connections above, use Table 8 to choose the proper setting for the current setting potentiometer.

Connecting the Step Motor

Phase 1 and Phase 3 of the step motor are connected to pins 1 and 2 on connector TB2. Phase 2 and Phase 4 of the step motor are connected to pins 3 and 4 on connector TB2. The Motors case can be grounded to pin 5 on connector TB2. Refer to Figures 1 & 2 for TYPICAL APPLICATION HOOK-UP.

Note: The physical direction of the motor with respect to the direction input will depend on the connection of the motor windings. To reverse the direction of the motor with respect to the direction input, switch the wires on Phase 1 and Phase 3.

WARNING: Do not connect or disconnect motor wires while power is applied!

Short-Circuit, Mis-Wire, and Over-Current Conditions

If it is found that there is a condition that causes on over current in the driver phase transistors, the Red LED will turn on solid and power will be shut off to the motor. To reset the drive turn power off, check wiring, and turn power back on.

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LIMITED WARRANTY
All Anaheim Automation products are warranted against defects in workmanship, materials and construction, when used under Normal Operating Conditions and when used in accordance with specifications. This warranty shall be in effect for a period of twelve months from the date of purchase or eighteen months from the date of manufacture, whichever comes first. **Warranty provisions may be voided if products are subjected to physical modifications, damage, abuse, or misuse.**

Anaheim Automation will repair or replace at its' option, any product which has been found to be defective and is within the warranty period, provided that the item is shipped freight prepaid, with previous authorization (RMA#) to Anaheim Automation's plant in Anaheim, California.

TECHNICAL SUPPORT
If you should require technical support or if you have problems using any of the equipment covered by this manual, please read the manual completely to see if it will answer the questions you have. If you need assistance beyond what this manual can provide, contact your Local Distributor where you purchased the unit, or contact the factory direct.

MBC082561 - Stepper Motor Driver

ANAHEIM AUTOMATION

FEATURES

- ***Cost-Effective Stepper Motor***
- ***Output Current 7.8 Amps Peak***
- ***400 to 51,200 Steps/Rev***
- ***Over and Under Voltage Protection***
- ***Short Circuit Protection***
- ***Selectable Stand Still Current Reduction***
- ***No Minimum Inductance***
- ***Optical Isolation***
- ***Motor ON/OFF Input***

DESCRIPTION

If you're looking for big value from a stepper driver, the MBC082561 is your answer. This powerful microstepping driver provides excellent torque in a compact and low profile enclosure. The MBC082561 is also very easy to use. It features rugged terminal blocks, a DIP switch for currents settings, and visible silkscreen for easy installation and configuration.
Versatile as well as powerful, the MBC082561 has a wide amperage range. It is designed to handle small stepper motors rated as low as 2.8 Amps/phase, mid-sized steppers such as NEMA 23's and 34's, as well as larger motors with current ratings up to 7.8 Amps. It operates from a DC voltage of 22-90 Volts, making it a great fit for almost any stepper application. The MBC082561 features optically isolated inputs that are 3.5 - 5.5VDC compatible. The clock input can be set to receive either sinking or sourcing clock signals at frequencies up to 500kHz. The driver also features direction control, motor on/off capabilities, and a built in short circuit, over voltage and under voltage protection.
The MBC082561 is a bipolar type driver designed for use with 4, 6, or 8 lead stepper motors, making it compatible for series and parallel installations. The driver has a maximum of 51,200 steps per revolution, with respect to a 1.8° stepper motor. It also has a motor current reduction feature that will help keep stepper motors cool at standstill, and LEDs that indicate power and fault condition shutdown.

Ideal Applications:

Automated machinery or processes that involve food, cosmetic, or medical packaging, labeling, or tamper-evident requirements, cut-to-length applications, electronic assembly, robotics, factory automation, special filming and projection effects, medical diagnostics, inspection and security devices, conveyor and material handling systems, metal fabrication (CNC machinery), pump flow control, XY and rotary tables, equipment upgrades or wherever precise positioning or speed control is required.

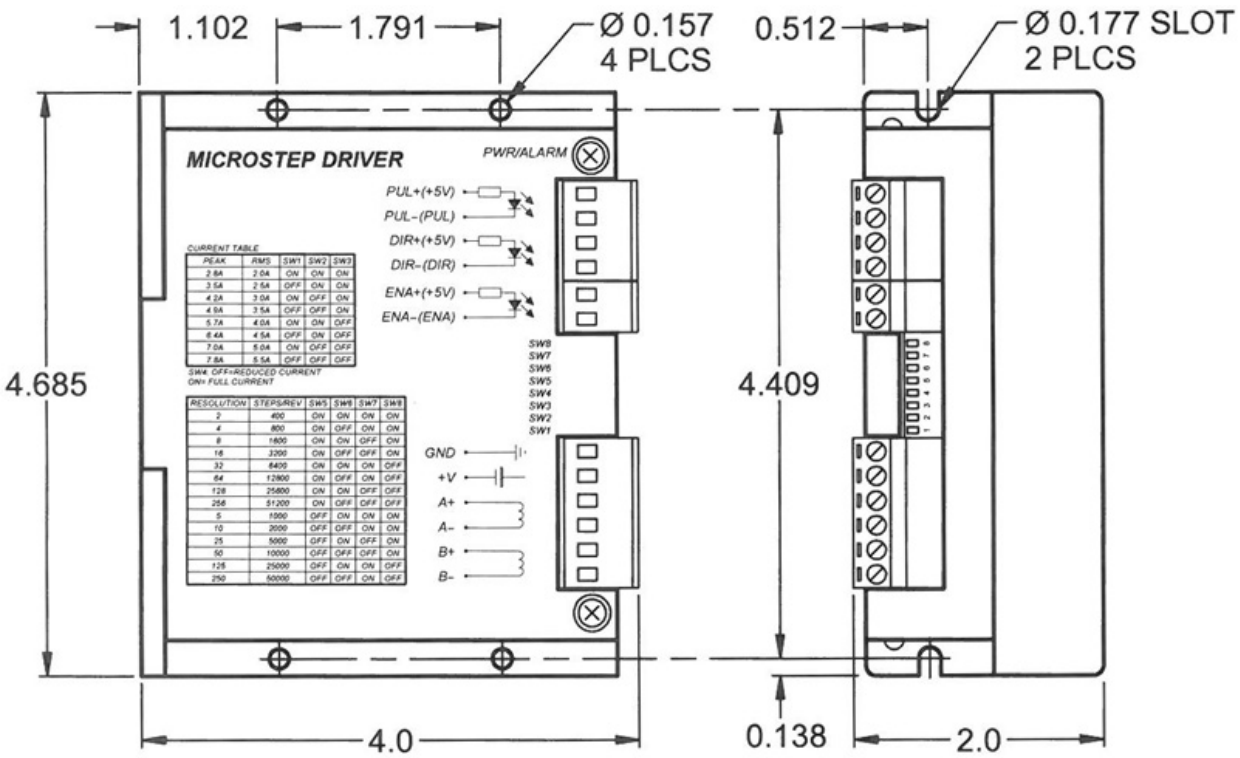
OPTIONAL POWER SUPPLY

Model #	Description	Input Voltage	Power (Watt)
PSA80V4A-1	80VDC Power Supply Up to 4.0 Amp Capability	110 or 220VAC	320
PSA40V4A	40VDC Power Supply Up to 4.0 Amp Capability	110 or 220VAC	160
PCL601	Single Axis Simple Programmable Controller, RS232/485 Compatible	24 VDC	-
PCL601USB	Single Axis Simple Programmable Controller, USB Compatible	24 VDC	-

L010358

910 East Orangefair Ln. Anaheim, CA 92801 **Tel. (714) 992-6990** Fax. (714) 992-0471 **www.anaheimautomation.com**

DIMENSION



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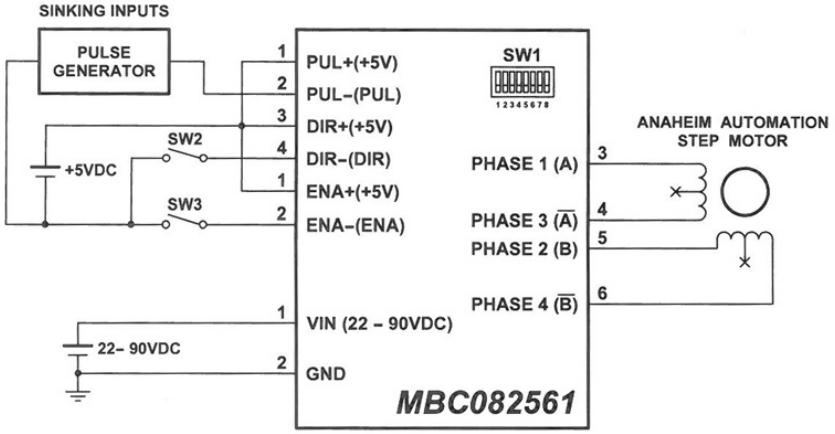

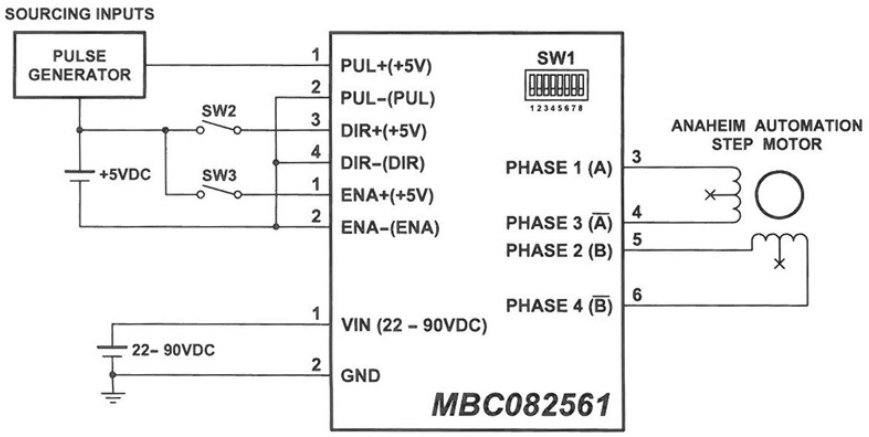

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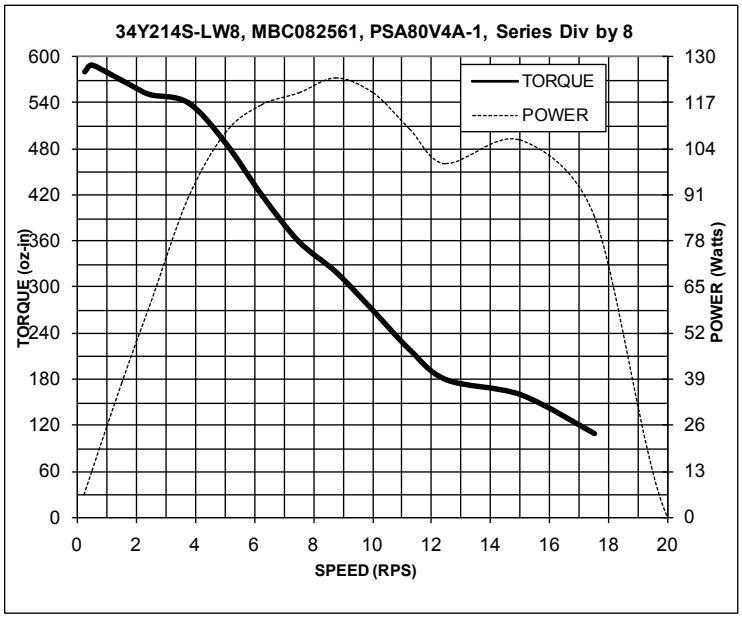

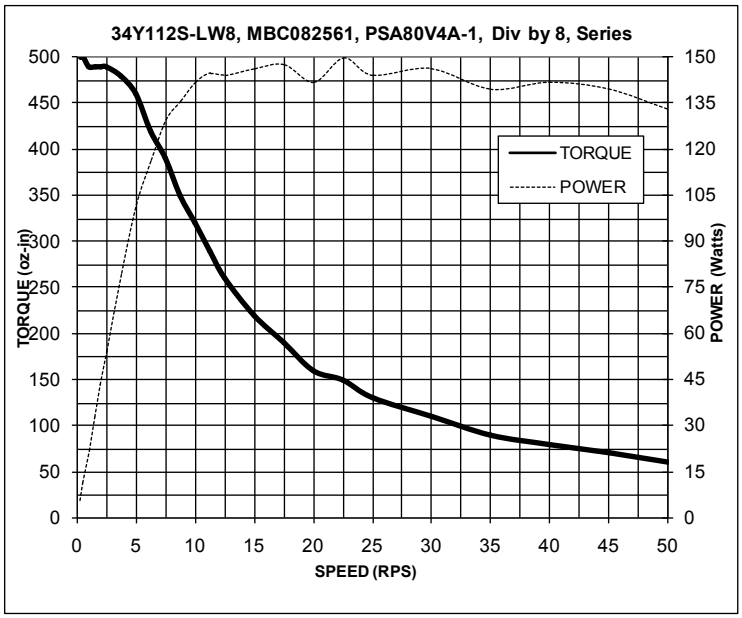

SPECIFICATIONS

Power Requirements:	22 - 90VDC
Output Current Range:	2.8 - 7.8 Amps (Peak)
Microstepping Resolution:	51,200 Steps/Revolution (Div-by-256)
Input Signal Voltage:	+5.0VDC
Input Clock Frequency:	0 - 500KHz
Minimum Input Current: (Isolated Inputs)	7.0mA
Storage Temperature	-20 to +65°C
Absolute Maximum Driver Temperature:	65°C
Driver Type:	Bipolar, Compatible with 4, 6 and 8 lead Motors. Series or Parallel Connection

MBC10641
Bipolar Microstep Driver

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#L010143 November 2003

MBC10641 Microstep Driver Features

- **Size 6.500"L x 2.025"W x 5.400"H**
- **Output Current 10.0 Amps Peak**
- **200 to 12,800 steps/rev (1,2,5,8,10,16,32 and 64 selectable step operations)**
- **Short Circuit Protection**
- **Over-Temperature and Over-Voltage Shutdown**
- **No Minimum Inductance**
- **Optical Isolation**
- **Motor ON/OFF input**

Introduction

The MBC10641 Microstep Driver has an output current capability of 1.5 Amps minimum to 10.0 Amps maximum (Peak Rating). The MBC10641 driver operates with either a transformer, whose input can be wired from 90-265 VAC or a DC voltage of 30-85 Volts. The inputs are optically isolated with a minimum sourcing of 7.0 mA per input (+5VDC minimum to +24VDC maximum). The clock input is set to receive either positive or negative edge clocks with a maximum frequency of 400KHz. The MBC10641 driver offers direction control and motor current ON/OFF capabilities. The Reduce Current Enabled automatically reduces motor current to 70% of set value after the last step is made (1sec delay). The driver has built-in features to indicate power on (Green LED), Clocks being received (Yellow LED) and fault conditions (Red LED).

With the MBC10641, various step resolutions can be implemented by the onboard dip switch. These divisions range from 200 steps per revolution to 12,800 steps per revolution. The bipolar drive configuration handles 4, 6 and 8 lead motors. Protection devices have been added to this driver for *Phase to Phase Short-Circuit, Motor Mis-Wire*, *Over-Temperature* and *Over-Voltage* conditions.

Pin Descriptions

The inputs on the MBC10641 are optically isolated with the anode (+) and cathode (-) both brought out to the user. With no current going through the opto-diode, the input is considered high. To enable the input a minimum of 7.0 mA needs to be sourced or sinked through the opto-diode. This is done simply by placing a voltage of +5 to +24 VDC across the two inputs of the opto-diode. If sourcing current into the inputs, then all three cathodes (-) should be tied together and grounded as shown in Figure 4. If sinking current, then all three anodes (+) should be tied together to the +voltage as shown in Figure 3. Provided on the MBC10641 is an external +5VDC out, which can be used to power the inputs for sinking mode only. However if you use this voltage, isolation is not preserved.

TB2: 5 Pin Terminal Description

Pin #	Description
1	Phase A: Phase 1 of the Step Motor
2	Phase $\overline{A}$: Phase 3 of the Step Motor
3	Phase B: Phase 2 of the Step Motor
4	Phase $\overline{B}$: Phase 4 of the Step Motor
5	Motor Ground

Table 1: Pin descriptions for terminal block TB2.

TB1: 8 Pin Terminal Description

Pin #	Description
1	Step Clock Input Anode (+): A positive going edge on this isolated input advances the motor one increment. The size of the increment is dependent on the Microstep Select Inputs of Switch 1.
2	Step Clock Input Cathode (-)
3	Direction Anode (+): This isolated input is used to change the direction of the motor. Physical direction also depends on the connection of the motor windings.
4	Direction Cathode (-)
5	ON/OFF Anode (+): This isolated input is used to enable and disable the output section of the driver. When HIGH (open) the outputs are enabled. However, this input does not inhibit the step clock.
6	ON/OFF Cathode (-)
7	+5 VDC: This non-isolated output can be used to supply up to 50mA of current to the isolated inputs. By doing this, isolation will be disabled.
8	0 VDC: +5 VDC return.

Table 2: Pin descriptions for terminal block TB1.

Power Supply Requirements

It is recommended that the MBC10641 be powered by the AA3621 corresponding transformer as specified. The AA3621 transformer has an input line voltage ranging from 90-265VAC, two high-voltage windings (yellow-yellow/black), and a logic winding (orange). The high voltage windings can be used to power two drivers or put into parallel to power one. If powering one driver, connect the two yellow wires together and connect the two yellow/black wires together and plug into the quick disconnects (QD1 and QD2, shown on Figures 3 & 4) located on the front face of the driver. When connecting two drivers, connect one yellow wire and one yellow/black wire (they come out together in pairs), and connect them to the quick disconnects (QD1 & QD2) located on the front face of each driver. When using the AA3621 transformer, the nominal voltage of the MBC10641 will be 80VDC. In Figure 1, the transformer wiring is shown for different line voltages ranging from 90-265VAC. A DC input of 30-85 volts can also be used to power the drive. To connect the DC to the drive, place the ground wire on the QD2, and the plus wire on QD1. It is recomended that fully insuated female quick connect connectors (Panduit # DNF14-250FIB) be used to connect to QD1 and QD2.

Transformer Drawings - Dimensions

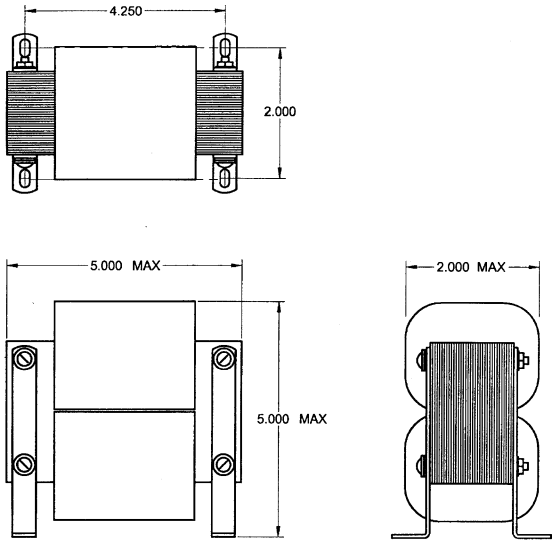


Figure 1: Physical dimensions of the AA3621 transformer

Transformer Drawings - Hook Ups

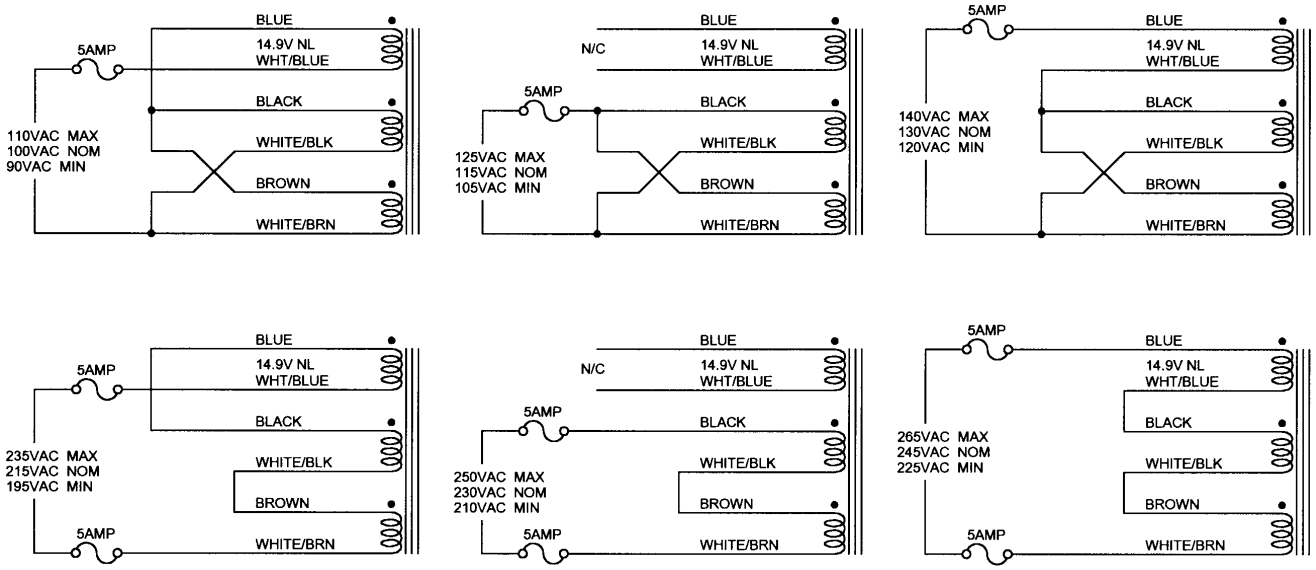


Figure 2: Wiring for various line voltages for the AA3621.

Absolute Maximum Ratings

Input Voltage: 60 VAC or 85 VDC
Output Current: 10.0 AMPS PEAK
Max Plate Temperature: 70° C
Storage Temperature: 0° to +50° C
Input Voltage (For isolated inputs): +24V at 7mA

Electrical Specifications

Item	Min	Typ	Max	Units
Input Voltage (Power)	20	55	60	VAC
Input Voltage (Power)	30	80	85	VDC
Phase Output Current	1.1		7.1	A (RMS)
Phase Output Current	1.5		10.0	A (PEAK)
Input Voltage (Inputs)	5.0		24	VDC
Clock Frequency	0		400	kHz
Chopping Frequency	47	50	53	kHz
+5VDC	4.8	5	5.2	V
+5VDC	0		50	mA
Operation Temperature	0		70	C

Table 3: MBC10641 electrical specifications

Hook Up Drawings

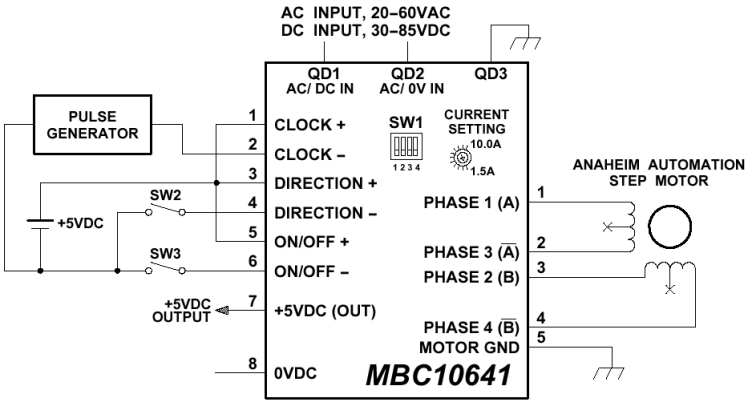


Figure 3: Hook up for current sinking inputs

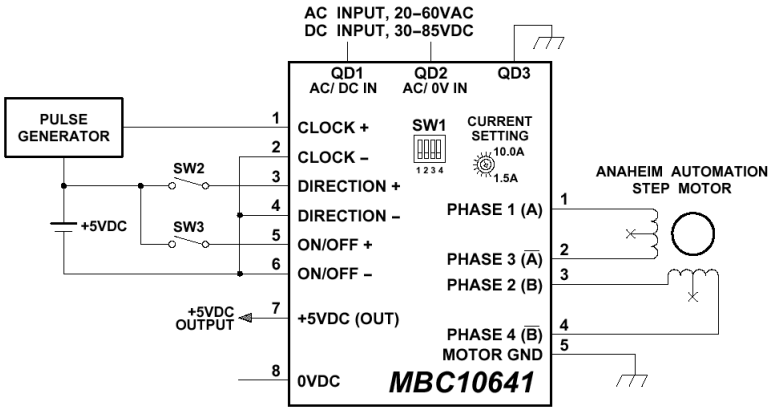


Figure 4: Hook up for current sourcing inputs

Power Connector Requirements

It is necessary that fully insulated female *quick connect* connectors be used for QD1, QD2 and QD3.

Panduit # DNF18-250FIB - Nylon fully insulated, funnel entry with insulation support and internal wire stop. Wire range of #22-18 and a tab size of .250 x .032 in.

Panduit # DNF14-250FIB - Nylon fully insulated, funnel entry with insulation support and internal wire stop. Wire range of #16-14 and a tab size of .250 x .032 in.

Panduit # DNF10-250FIB - Nylon fully insulated, funnel entry with insulation support and internal wire stop. Wire range of #12-10 and a tab size of .250 x .032 in.

Optically Isolated Inputs

The following inputs to the MBC10641 are Optically Isolated.

Item	Pin #
Clock	1 & 2
Direction	3 & 4
On/Off	5 & 6

To enable an input, apply a DC voltage source of +5VDC to +24VDC across the inputs. The Anodes (+) are pins 1,3,and 5 and the Cathodes (-) are pins 2, 4, and 6.

Motor Selection

The MBC10641 is a Bipolar Microstep Driver that is compatible with both Bipolar and Unipolar Motor Configurations, (i.e. 8 and 4 lead motors, and 6 lead center tapped motors).

Step motors with low current ratings and high inductance will perform better at low speeds, providing higher low-end torque. Motors with high current ratings and low inductance will perform better at higher speeds, providing more high-end torque. Higher voltages will cause the current to flow faster through the motor coils. This in turn means higher step rates can be achieved. *Care should be taken not to exceed the maximum voltage of the driver.*

Since the MBC10641 is a constant current source, it is not necessary to use a motor that is rated at the same voltage as the supply voltage. What is important is that the MBC10641 is set to the appropriate current level based on the motor being used. Refer to the following chart for setting the current potentiometer based on the current code in the part number of the motor. Examples of motor part numbers are shown below. Anaheim Automation offers a comprehensive line of step motors in 14, 17, 23, 34 and 42 frame sizes. Contact the factory to verify motor compatibility with the MBC10641.

Step Motor Current Setting Guide

Motor Example	Motor Current Number Code	Unipolar Rating	Series Peak Rating	Parallel Peak Rating	Series Current Setting	Parallel Current Setting
23D102S	02	1.0A	1.0A	2.0A	----	5%
23L303D-LW8	03	1.5A	1.5A	3.0A	0%	20%
34N104S-LW8	04	2.0A	2.0A	4.0A	5%	30%
23L4005D-LW8	05	2.5A	2.5A	5.0A	10%	40%
34A106B	06	3.0A	3.0A	6.0A	20%	50%
34N207S-LW8	07	3.5A	3.5A	7.0A	25%	60%
34K108S-LW8	08	4.0A	4.0A	8.0A	30%	70%
42N209S-CB	09	4.5A	4.5A	9.0A	35%	85%
23L310S-LW8	10	5.0A	5.0A	10.0A	40%	100%
34D311D	11	5.5A	5.5A	11.0A	45%	100%
42K112S-CB	12	6.0A	6.0A	12.0A	50%	100%
34D213S	13	6.5A	6.5A	13.0A	55%	100%
34N314S-LW8	14	7.0A	7.0A	14.0A	60%	100%
42N115D-CB	15	7.5A	7.5A	15.0A	65%	----
34K416S-LW8	16	8.0A	8.0A	16.0A	70%	----
42D119D	19	9.5A	9.5A	19.0A	90%	----
42N322S-CB	22	11.0A	11.0A	22.0A	100%	----
42D225S	25	12.5A	12.5A	25.0A	100%	----

Table 5: Table selection for Anaheim Automation motor current settings.

Anaheim Automation offers motor cable, making hook-ups quick and easy!
Contact the factory or visit our website for more motor and cable offerings.

Microstep Selection (SW1 Settings)

Switches 2, 3 and 4, of the DIP switch select the number of microsteps per step. Table 6 shows the standard resolution values along with the associated positions for the select switches. The standard waveforms are sinusoidal.

Resolution	Steps/Rev	Select 1	Select 2	Select 3	Select 4	Auto Reduce Current
1	200	OFF	ON	ON	ON	Disabled
2	400	OFF	ON	ON	OFF	Disabled
5	1000	OFF	ON	OFF	ON	Disabled
8	1600	OFF	ON	OFF	OFF	Disabled
10	2000	OFF	OFF	ON	ON	Disabled
16	3200	OFF	OFF	ON	OFF	Disabled
32	6400	OFF	OFF	OFF	ON	Disabled
64	12800	OFF	OFF	OFF	OFF	Disabled
1	200	ON	ON	ON	ON	Enabled
2	400	ON	ON	ON	OFF	Enabled
5	1000	ON	ON	OFF	ON	Enabled
8	1600	ON	ON	OFF	OFF	Enabled
10	2000	ON	OFF	ON	ON	Enabled
16	3200	ON	OFF	ON	OFF	Enabled
32	6400	ON	OFF	OFF	ON	Enabled
64	12800	ON	OFF	OFF	OFF	Enabled

Table 6: Microstep selection on switch 1.

Setting the Output Current

The output current on the MBC10641 is set by an onboard potentiometer. This potentiometer determines the per phase peak output current of the driver. The relationship between the output current and the potentiometer value is as follows:

Peak Current	Potentiometer Setting	Peak Current	Potentiometer Setting
1.5A	0%	7.0A	60%
2.3A	10%	7.9A	70%
3.1A	20%	8.7A	80%
4.0A	30%	9.6A	90%
5.0A	40%	10A	100%
6.0A	50%	--	--

Table 7: Potentiometer values with respect to the output current
Refer to Table 5 for specific motor current settings.

Reducing Output Current

Reducing the output current is accomplished by setting switch 1 of the DIP switch to the ON position and occurs approximately 1 second after the last positive going edge of the step clock input. The amount of current per phase in the reduction mode is approximately 70% of the set current. When the current reduction circuit is activated, the current reduction resistor is paralleled with the current adjustment potentiometer. This lowers the total resistance value, and thus lowers the per Phase output current.

Determining Output Current

The output current for the motor used when microstepping is determined differently from that of a full/half step unipolar driver. In the MBC10641, a sine/cosine output function is used in rotating the motor. The output current for a given motor is determined by the motors current rating and the wiring configuration of the motor. There is a current adjustment potentiometer used to set the output current of the MBC10641. This sets the peak output current of the sine/cosine waves. The specified motor current (which is the unipolar value) is multiplied by a factor of 1.0, 1.4, or 2.0 depending on the motor configuration (series, half-coil, or parallel).

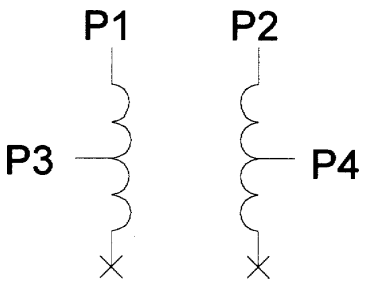
Step Motor Configurations

Step motors can be configured as 4, 6, or 8 leads. Each configuration requires different currents. Refer to the lead configurations and the procedures to determine their output current.

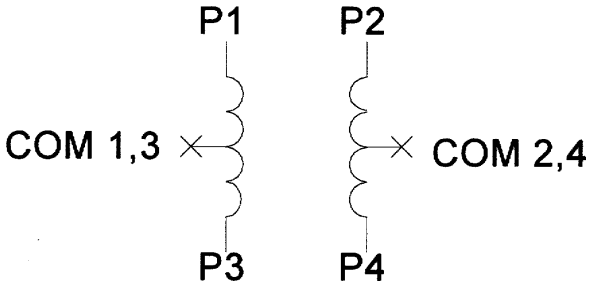
WARNING! Step motors will run hot even when configured correctly. Damage may occur to the motor if a higher than specified current is used. Most specified motor currents are maximum values. Care should be taken to not exceed these ratings.

6 Lead Motors

When configuring a 6 lead motor in a ***half-coil configuration*** (connected from one end of the coil to the center tap), multiply the specified per Phase (or unipolar) current rating by 1.4 to determine the current setting potentiometer value. This configuration will provide more torque at higher speeds when compared to the series configuration.

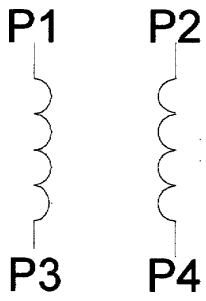


When configuring the motor in a ***series configuration*** (connected from end to end with the center tap floating) use the specified per Phase (or unipolar) current rating to determine the current setting potentiometer value.



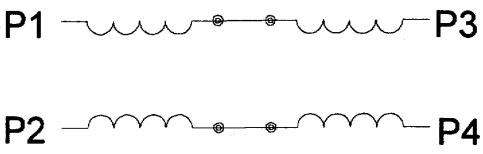
4 Lead Motors

Multiply the specified ***series*** motor current by 1.4 to determine the current adjustment potentiometer value. Four Lead Motors are usually rated with their appropriate series current, as opposed to the *Phase Current*, which is the rating for 6 and 8 lead motors.

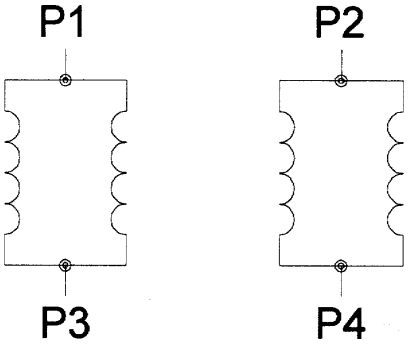


8 Lead Motors

Series Connection: When configuring the motor windings in series, use the per Phase (or unipolar) current rating to determine the current setting potentiometer value.



Parallel Connection: When configuring the motor windings in parallel, multiply the per Phase (or unipolar) current rating by 2.0 to determine the current setting potentiometer value.



NOTE: After the current has been determined, according to the motor connections above, use Table 3 to choose the proper setting for the current setting potentiometer.

Connecting the Step Motor

Phase 1 and 3 of the Step Motor is connected between pins 1 and 2 on the motor connector (TB2). Phase 2 and 4 of the Step Motor is connected between pins 3 and 4 on the motor connector (TB2). The motors case can be grounded to pin 5 on the motor connector (TB2). Refer to Figures 2, 3 & 4 for TYPICAL APPLICATION HOOK-UP.

NOTE: The physical direction of the motor with respect to the direction input will depend on the connection of the motor windings. To reverse the direction of the motor with respect to the direction input, switch the wires on Phase 1 and Phase 3.

WARNING: Do not connect or disconnect motor wires while power is applied!

Short-Circuit, Mis-Wire, and Over-Current Conditions

If it is found that there is a condition that causes on over current in the driver phase transistors, the Red LED will turn on solid and power will be shut off to the motor. To reset the drive turn power off, check wiring, and turn power back on.

Over-Temperature and Over-Voltage Conditions

If it is found that there is an over temperature on the internal heat sink, or an over voltage on the motor bus voltage, the Red LED will blink and power will be shut off to the motor. To reset the drive turn power off, check wiring, and turn power back on.

Dimension Drawing

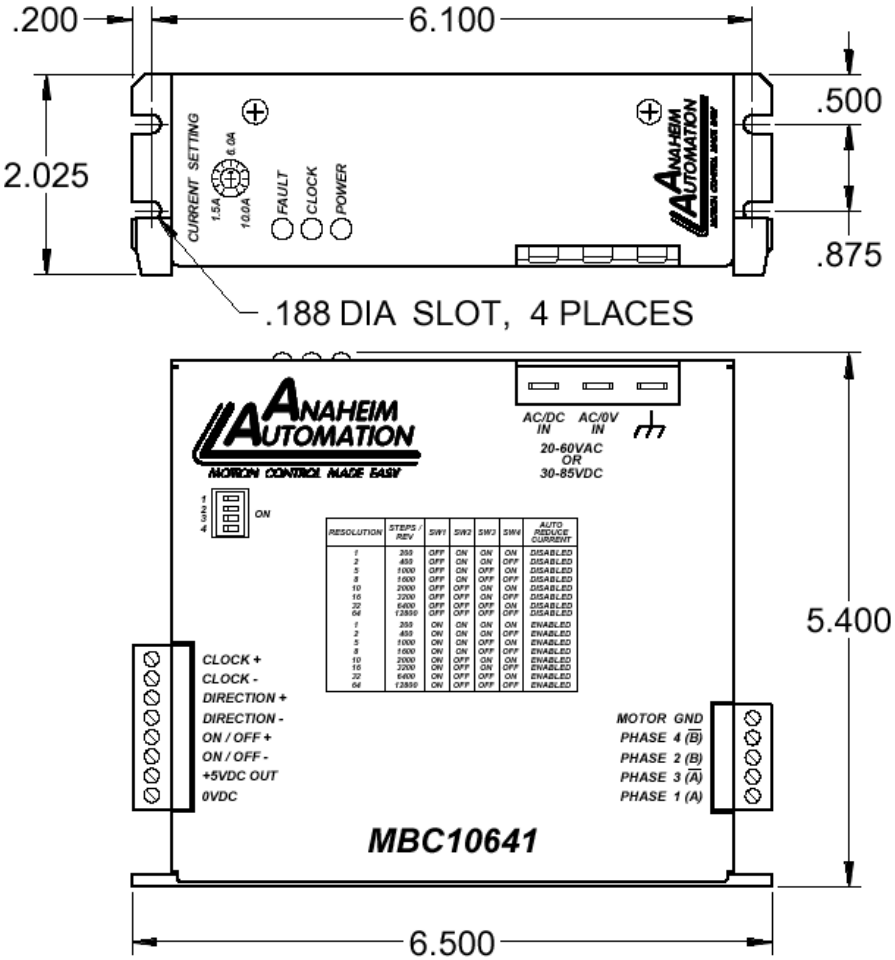
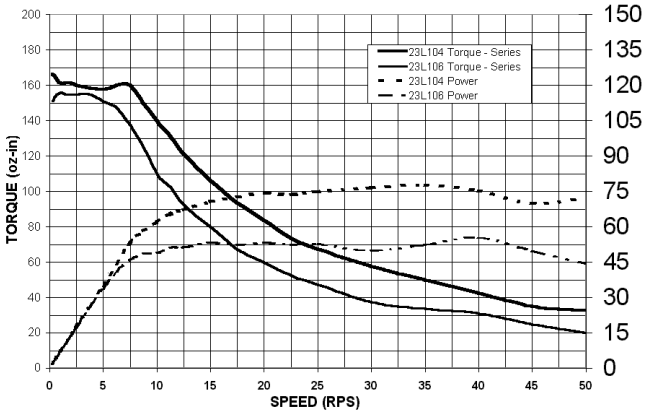


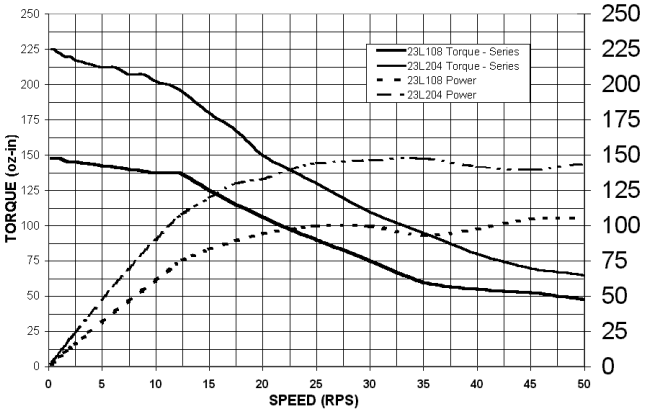
Figure 5: MBC10641 dimensions

Torque Speed Curves

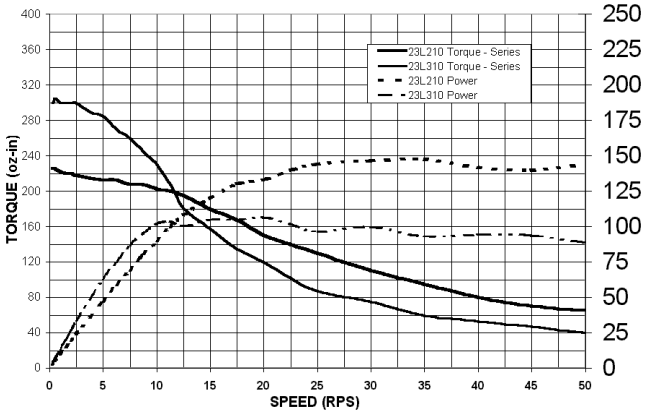
MBC10641 with 23L104 and 23L106 at 80V



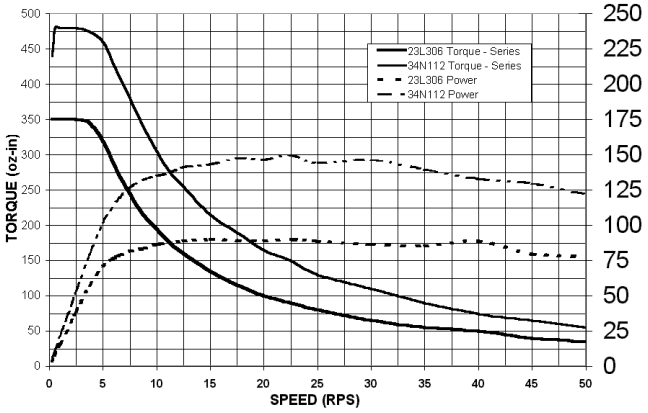
MBC10641 with 23L108 and 23L204 at 80V



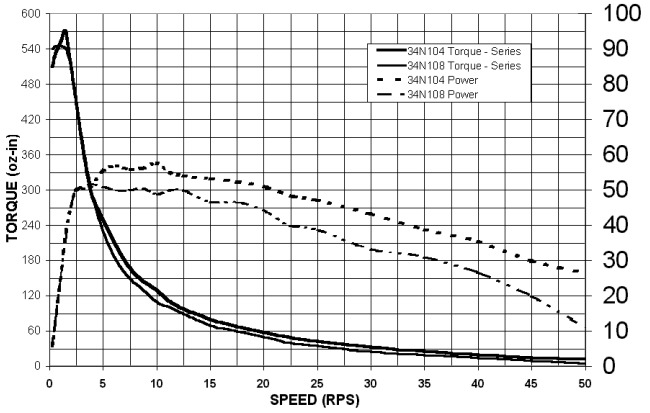
MBC10641 with 23L210 and 23L310 at 80V



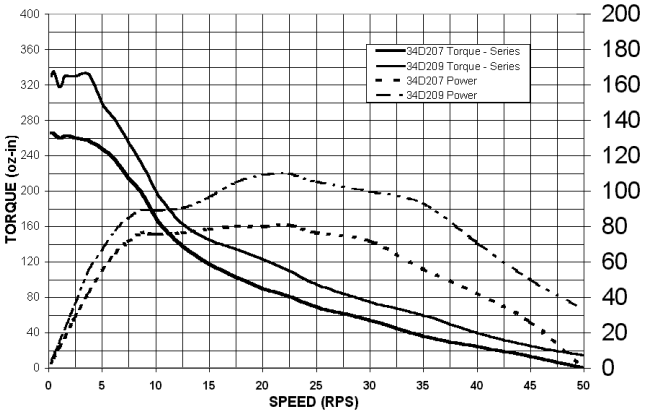
MBC10641 with 23L306 and 34N112 at 80V



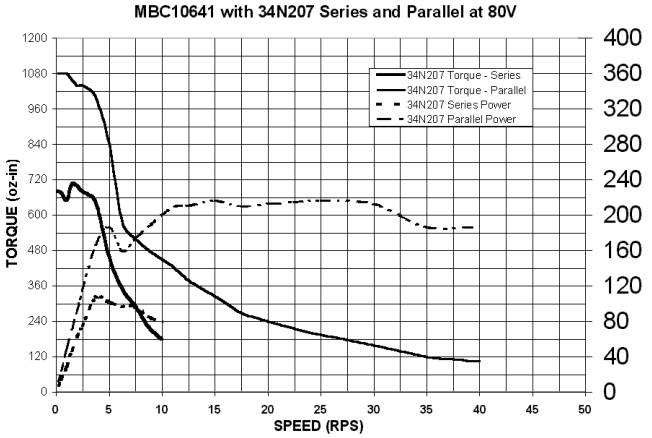
MBC10641 with 34N104 and 34N108 at 80V

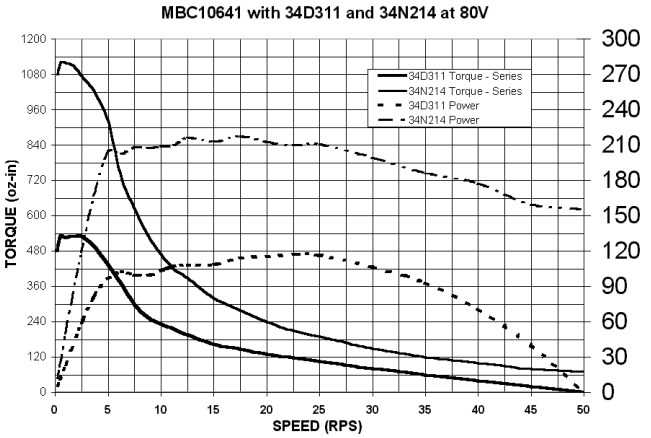


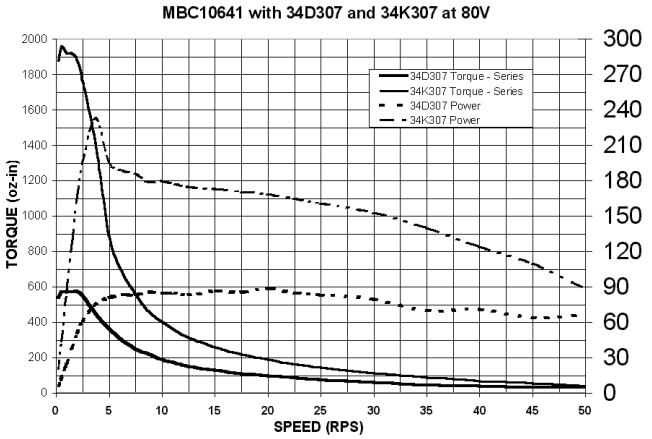
MBC10641 with 34D207 and 34D209 at 80V

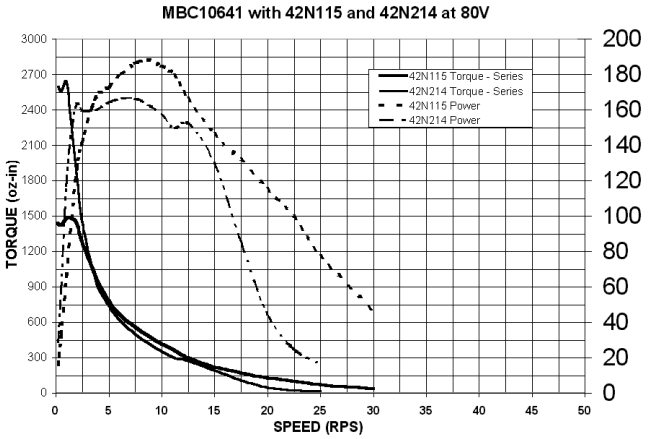


Torque Speed Curves









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Anaheim Automation will repair or replace at its' option, any product which has been found to be defective and is within the warranty period, provided that the item is shipped freight prepaid, with previous authorization (RMA#) to Anaheim Automation's plant in Anaheim, California.

TECHNICAL SUPPORT
If you should require technical support or if you have problems using any of the equipment covered by this manual, please read the manual completely to see if it will answer the questions you have. Be sure to refer to the TROUBLESHOOTING section of this manual. If you need assistance beyond what this manual can provide, contact your Local Distributor where you purchased the unit, or contact the factory direct.

MBC158 Microstep Driver

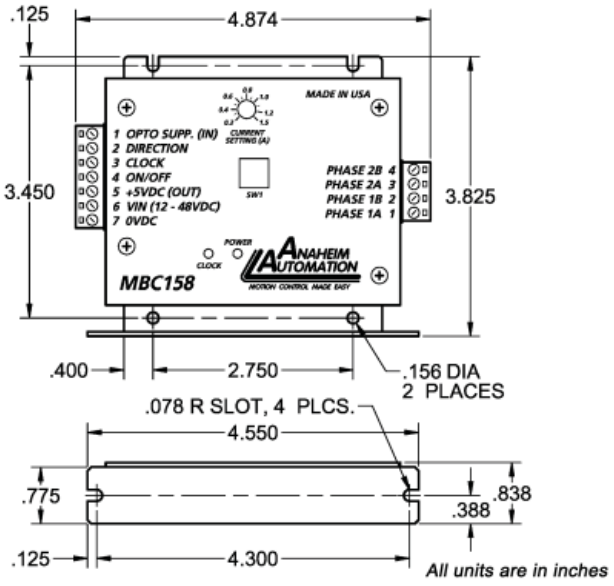
FEATURES

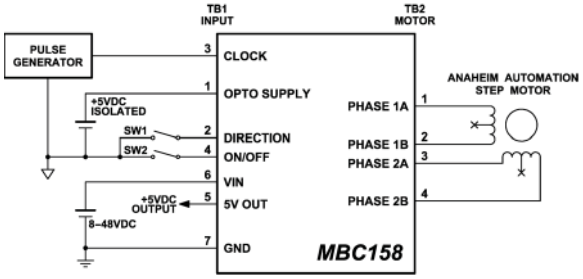
- ***1.5 Amps/Phase Output Current***
- ***Microstepping Drive Operation***
- ***1, 2, 4 and 8 Selectable Step Operations***
- ***Opto Isolated Inputs***
- ***Internal Thermal Shutdown***
- ***Motor On/Off Input***
- ***Current Reduction***
- ***Dimensions: 4.65” x 3.75” x 0.875”***

DESCRIPTION

The MBC158 Microstep Motor Driver has an output current capability from 0.2 Amps Minimum to 1.5 Amps Maximum (Peak Rating). The MBC158 driver will operate off 12VDC Minimum to 48VDC Maximum (up to 1.75 Amps). The inputs are Opto-Isolated with a minimum sourcing of 5 mA per input (5VDC Minimum to 12VDC Maximum). The clock input is set to receive negative edge clocks with a maximum frequency of 100k Hz. The direction input is current sourcing for CW and no current for CCW. The ON/OFF feature is current sourcing to de-energize the step motor and no current to energize the motor. Reduce Current Enabled automatically reduces Motor current 50% after last step (20msec delay). The +5VDC output supply is dependent on the input DC Supply Voltage (200mA @ 48VDC, 450mA @ 24VDC and 1000mA @ 12VDC). The driver has built-on features to indicate power on (Green LED) and built-on features to indicate power on (Green LED) and Clocks being received, greater than 100Hz (Yellow LED).

DIMENSIONS/WIRING DIAGRAMS





Potentiometer	AMPS
0%	0.2
10%	0.33
20%	0.46
30%	0.59
40%	0.72
50%	0.85
60%	0.98
70%	1.11
80%	1.23
90%	1.36
100%	1.50

L010056

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Pin	Name	Description
1	Opto Supply	5VDC Minimum to 12VDC Maximum @ 50mA maximum is required to power the opto-isolated inputs (Clock, Direction and On/Off).
2	Direction	The DIRECTION input controls the direction in which the motor steps. If the DIRECTION input is high the motor will step in the counterclockwise (CCW) direction.
3	Clock	The Clock input is the stepping clock for the driver. When the clock input transitions from high to low, the motor takes one step.
4	On/Off	The ON/OFF input controls the motor. If the ON/OFF input is high, the motor will step with the clock and will have holding current at standstill. If the ON/OFF input is low the motor will be turned off with no holding current and clock signals will be ignored. When the ON/OFF input becomes high again, the motor will hold at the step it was in when the ON/OFF input went low.
5	5VOUT	The 5VOUT pin provides a regulated 5VDC output from the driver. The +5VDC output supply is dependent on the input DC Supply Voltage (200mA @ 48VDC, 450mA @ 24VDC and 1000mA @ 12VDC).
6	+VIN	Input power supply requirement is 12VDC minimum to 48VDC maximum.
7	0VDC	This pin is the return/reference point for +VIN and +5VOUT.

The logic inputs to the MBC158 are of the sourcing type, meaning that an input left open will automatically be pulled up to a high level. To drive an input low, tie it to ground directly or use a saturated transistor.

Connector TB2 (Output)

Pin	Name	Description
1	Phase 1A	Motor Phase A or Phase 1.
2	Phase 1B	Motor Phase /A or Phase 3.
3	Phase 2A	Motor Phase B or Phase 2.
4	Phase 2B	Motor Phase /B or Phase 4.

Microstep Modes (SW Settings)

Microstep Modes	DIP SW1	DIP SW2	DIP SW3	Auto Reduce Current
Full Step	OFF	OFF	OFF	DISABLED
Half Step	ON	OFF	OFF	DISABLED
Quarter Step	OFF	ON	OFF	DISABLED
Eighth Step	ON	ON	OFF	DISABLED
Full Step	OFF	OFF	ON	ENABLED
Half Step	ON	OFF	ON	ENABLED
Quarter Step	OFF	ON	ON	ENABLED
Eighth Step	ON	ON	ON	ENABLED

Specifications

Inputs (All)	Opto-Isolated, Minimum sourcing of 5 mA per input (5VDC Minimum to 12VDC maximum) applied to Opto Supply input.
Continuous Output Current	200mA minimum to 1500mA maximum (peak rating). If Reduce Current is Enabled the drive will automatically reduce motor current to 50% of setting after the last step pulse is received (20msec delay).
Supply Voltage	12 - 48VDC
Clock Frequency	0 - 100kHz minimum pulse width require is 3 microseconds.
Chopping Frequency	22kHz
+5VDC	The +5VDC output supply is dependent on the input DC Supply Voltage (200mA @ 48VDC, 450mA @ 24VDC and 1000mA @12VDC).
Operating Temperature	0 - 70°C over the operating voltage and current range. It is recommended that the driver be mounted to a

MBC15081
Bipolar Microstep Driver

User's Guide

ANAHEIM AUTOMATION
910 East Orangefair Lane, Anaheim, CA 92801 (714) 992-6990 fax: (714) 992-0471
e-mail: info@anaheimautomation.com website: www.anaheimautomation.com

L010133 January 2013

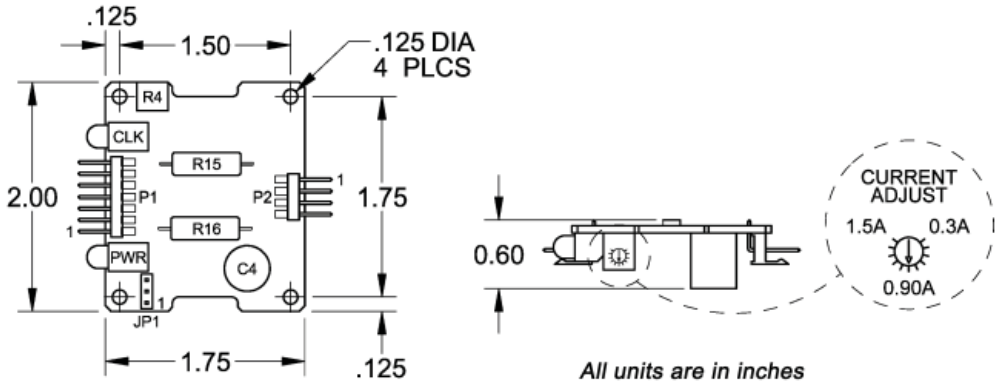
MBC15081 Features

- 1.5 Amps/Phase Output Current
- Bipolar Microstepping Driver Operation
- Over Temperature and Short Circuit Shutdown
- Microstep Divisors of 8, 4, 2, or Full Step
- Compact Package: 2.00” x 1.75” x 0.60”
- 12-24VDC Power Requirement
- Accepts TTL Logic or 24V Level Inputs
- Ideal for Precise Positioning
- Efficient and Durable
- Long Life Expectancy

General Description

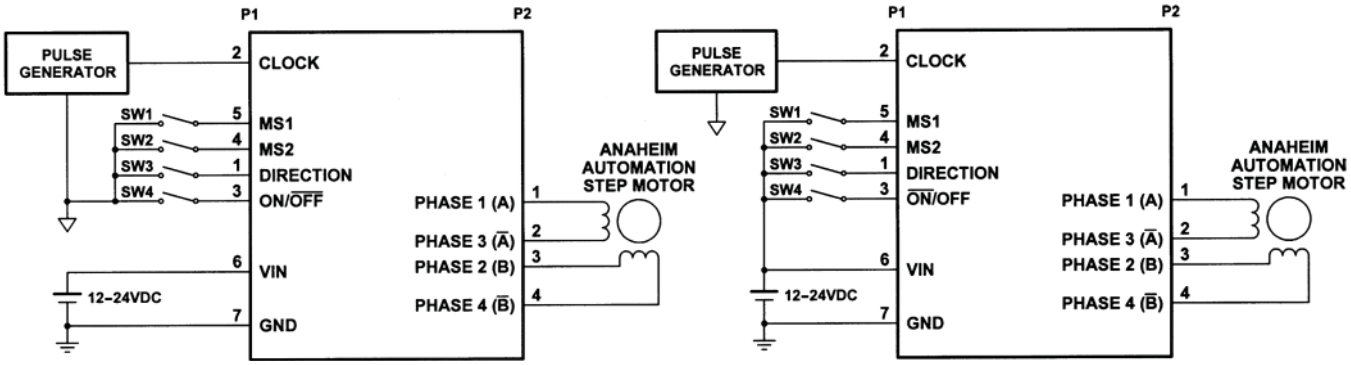
The MBC15081 is a 1.5 amps/phase bipolar microstep driver capable of running four, six, and eight lead step motors. The MBC15081 has an output current range of 0.5 to 1.5 amps/phase and operates off 12VDC minimum to 24VDC maximum. The inputs are capable of running from either open collector or TTL level logic outputs, or sourcing 24VDC outputs from PLCs. The MBC15081 features resolutions from 200 - 1600 steps/revolution, providing smooth rotary operation. The MBC15081 features include built in over temperature and short circuit shut down, automatic 70% reduction in current after clock pulses step being received, and status LED’s to indicate power on (green LED) and clocks being received (yellow LED). The MBC15081 is a compact, low profile package meant to be used where space is limited but performance is expected.

Dimensions



Ordering Information	
Part Number	Description
MBC15081	12-24VDC, 0.3-1.5A Bipolar Microstep Driver, Open Frame
MBC25081	12-24VDC, 0.5-2.5A Bipolar Microstep Driver, Packaged with Heat Sink
CBL-AA4031	7 Pin Input Connector with 12”, 22AWG Leads
CBL-AA033	4 Pin Motor Connector with 12”, 22AWG Leads
PSAM24V2.7A	24V @ 2.7A Universal Input Power Supply
CON-6404407	7 Pin Connector with 0.100” Centers (Amp #640440-7)
CON-6404404	4 Pin Connector with 0.100” Centers (Amp #640440-4)

Wiring Diagrams



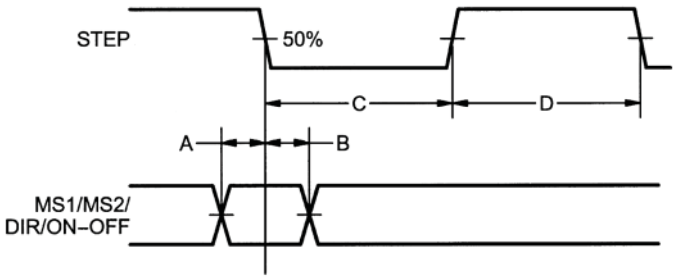
Input Pin Descriptions		
Pin #	Description	CBL-AA4031 Wire Color
1	Direction	Brown
2	Clock	Red
3	On/Off	Orange
4	MS2	Yellow
5	MS1	Green
6	12VDC-24VDC	Blue
7	0VDC (Gnd)	Violet

Input Pin Descriptions		
Pin #	Description	CBL-AA4033 Wire Color
1	Phase A	Brown
2	Phase Ā	Red
3	Phase B	Orange
4	Phase B̄	Yellow

Direction: Logic “1” CW
Logic “0” CCW
Clock: Active - 1 Step
Inactive (open) - Reduce Current Mode
On/Off: Active - Off
Inactive (open) - On

Notes:
Opens Inputs are inactive and internally pulled up to +5VDC for JP1 position 1-2 (Sinking)
Open Inputs are inactive and internally pulled down to 0VDC for JP1 position 2-3 (sourcing)

Microstep Resolution Truth Table		
MS1	MS2	Resolution
Active	Active	Full Step
Inactive (Open)	Active	Half Step
Active	Inactive (Open)	Quarter Step
Inactive (Open)	Inactive (Open)	Eighth Step



A. Minimum Command Active Time Before Clock Pulse (Data Set-Up Time)...200nS
B. Minimum Command Active Time After Clock Pulse (Data Hold Time).....200nS
C. Minimum Clock Pulse Width.....1.0uS
D. Minimum Clock Inactive Time.....1.0uS
Maximum Clock Frequency.....500kHz

With JP1 in position 1-2 (sinking) the inputs are considered inactive of Logic “1” if left open, or active or Logic “0” if grounded. With JP1 in position 2-3 (sourcing) the inputs are considered inactive or Logic “0” if left open, and active or Logic “1” if pulled to 3.5 - 24VDC.

Step Motor Configurations
The output current on the MBC15081 is set by the onboard potentiometer. This potentiometer determines the per phase peak output current of the driver. The relationship between the output current and the potentiometer value is as follows:

WARNING! Step motors will run hot even when configured correctly. Damage may occur to the motor if a higher than specified current is used. Most specified motor currents are maximum values. Care should be taken to not exceed these ratings.

MBC15081 Potentiometer Settings

Peak Current	Potentiometer Setting	Peak Current	Potentiometer Setting
0.30A	0%	1.02A	60%
0.42A	10%	1.14A	70%
0.54A	20%	1.26A	80%
0.66A	30%	1.38A	90%
0.78A	40%	1.50A	100%
0.90A	50%	--	--

Reducing Output Current
Reducing the output current is accomplished automatically and occurs approximately 20mSec after the last of the clock input has been received. The amount of current per phase in the reduction mode is approximately 70% of the set current. When the current reduction circuit is activated, the current reduction resistor is paralleled with the current adjustment potentiometer. This lowers the total resistance value, and thus lowers the per phase output current.

Connecting the Step Motor
Phase 1 and Phase 3 of the step motor are connected to pins 1 and 2 on connector P2. Phase 2 and Phase 4 of the step motor are connected to pins 3 and 4 on connector P2. Please refer to the figure for a typical APPLICATION HOOK-UP.

Note: the physical direction of the motor with respect to the direction input will depend on the connection of the motor windings. To reverse the direction of the motor with respect to the direction input, switch the wires on Phase 1 and Phase 3.
WARNING: DO NOT CONNECT OR DISCONNECT MOTOR WIRES WHILE POWER IS APPLIED!

Motor Selection
The MBC15081 is a Bipolar Microstep Driver that is compatible with both Bipolar and Unipolar Motor Configurations, (i.e. 8 and 4 lead motors, and 6 lead center tapped motors).

Step motors with low current ratings and high inductance will perform better at low speeds, providing higher low-end torque. Motors with high current ratings and low inductance will perform better at higher speeds, providing more high-end torque.

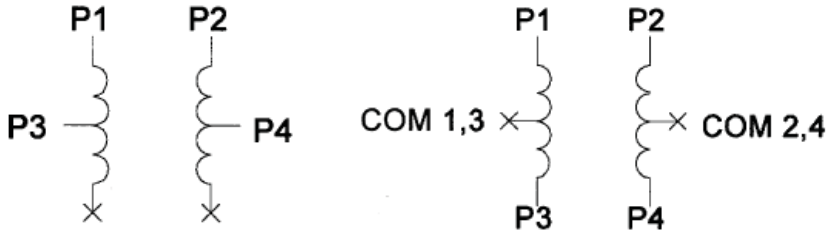
Since the MBC15081 uses a constant current source drive technique, it is not necessary to use a motor that is rated at the same voltage as the supply voltage. What is important is that the potentiometer is set to the appropriate current level based on the motor being used. Higher voltages will cause the current to flow faster through the motor coils. This in turn means higher step rates can be achieved. ***Care should be taken not exceed the maximum voltage of the driver.***

Step Motor Configurations
Step motors can be configured as 4, 6 or 8 leads. Each configuration requires different currents. Refer to the lead configurations and the procedures to determine their output current.

Determining Output Current
The Output current for a motor used with a bipolar driver is determined differently from that of a unipolar driver. In the MBC15081, a sine/cosine output function is used in rotating the motor. The output current for a given motor is determined by the motors current rating and the wiring configuration of the motor. There is a current adjustment potentiometer used to set the output current of the MBC15081. This sets the peak output current of the sine/cosine waves. The specified motor current (which is the unipolar value) is multiplied by a factor of 1.0, 1.4, or 2.0 depending on the motor configuration (series, half-coil, or parallel).

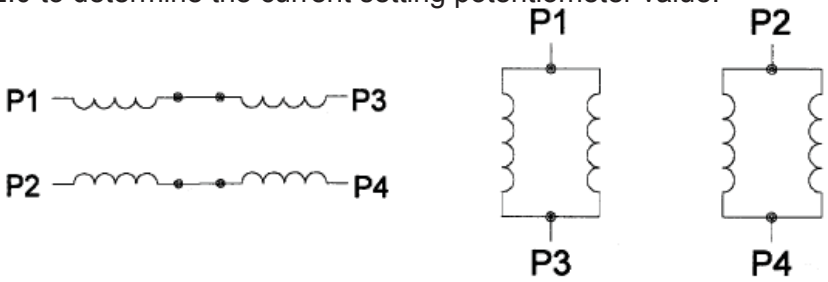
6 Lead Motors
Half-Coil Connection: When configuring a 6 lead motor in half-coil (connected from one end of the coil to the center tap), multiply the specified per Phase (or unipolar) current rating by 1.4 to determine the current setting potentiometer value. This configuration will provide more torque at higher speeds when compared to the series configuration.

Series: When configuring the motor is series (connected from end to end with the center tap floating) use the specified per Phase (or unipolar) current rating to determine the current setting potentiometer value.

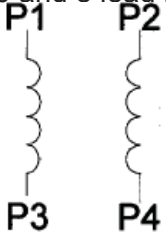


8 Lead Motors
Series Connection: When configuring the motor windings in series, use the per Phase (or unipolar) current rating to determine the current setting potentiometer value.

Parallel Connection: When configuring the motor windings in parallel, multiply the per Phase (or unipolar) current rating by 2.0 to determine the current setting potentiometer value.



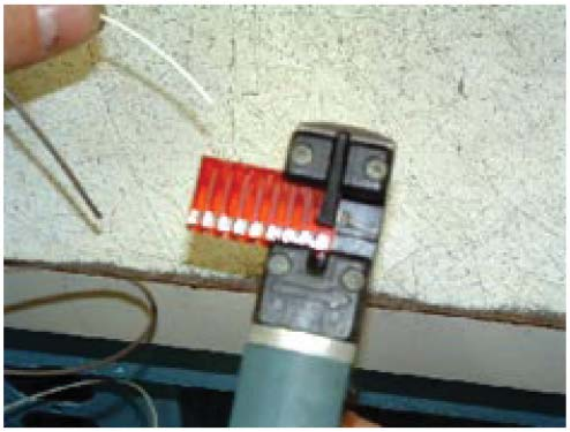
4 Lead Motors
Series Connection: Multiply the specified series motor current by 1.4 to determine the current adjustment potentiometer value. Four Lead Motors are usually rated with their appropriate series current, as opposed to the *Phase Current,* which is the rating for 6 and 8 lead motors.

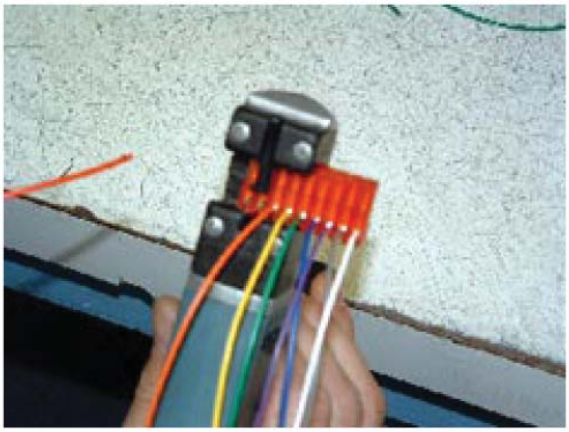


Connecting to the MBC15081

The MBC15081 is designed with cost savings and size as two of the primary design criteria. For this reason, the MTA-100 series connector was chosen for these products as a reliable small and low cost connector. This is a common Insulation Displacement Connector (IDC) manufactured by AMP Corporation. The inputs to the driver are on a 7-pin connector and the motors are on a 4-pin connector. These connectors are not supplied with the driver, but can be purchased from Anaheim Automation or AMP/Tyco Electronics.

These two images show how a hand tool can be used to quickly make the cable to connect to the driver. This cable can be made in approximately 10 seconds per wire using the hand tool.





Tooling from AMP/Tyco Electronics	
Part Number	Description
58074-1	Manual Hand Tool with Interchangeable Head (shown above)
58075-1	Air Hand Tool with Interchangeable Head
58338-1	Air Bench Mount Tool with Interchangeable Head and Foot Switch
58246-1	Die Head for Closed End MTA-100 Connectors (shown above)

Connectors from AMP/Tyco Electronics	
Part Number	Description
640440-7	7 Pin MTA-100 Connector, Closed End with Lock, 22 AWG Red, Tin Plated
640440-4	4 Pin MTA-100 Connector, Closed End with Lock, 22 AWG Red, Tin Plated
640441-7	7 Pin MTA-100 Connector, Closed End with Lock, 24 AWG White, Tin Plate
640441-4	4 Pin MTA-100 Connector, Closed End with Lock, 24 AWG White, Tin Plated
640440-7	7 Pin MTA-100 Connector, Closed End with Lock, 26 AWG Blue, Tin Plated
640442-4	4 Pin MTA-100 Connector, Closed End with Lock, 26 AWG Blue, Tin Plated

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Anaheim Automation's general policy does not recommend the use of its' products in life support applications wherein a failure or malfunction of the product may directly threaten life or injury. Per Anaheim Automation's Terms and Conditions, the user of Anaheim Automation products in life support applications assumes all risks of such use and indemnifies Anaheim Automation against all damages.

LIMITED WARRANTY
All Anaheim Automation products are warranted against defects in workmanship, materials and construction, when used under Normal Operating Conditions and when used in accordance with specifications. This warranty shall be in effect for a period of twelve months from the date of purchase or eighteen months from the date of manufacture, whichever comes first. **Warranty provisions may be voided if products are subjected to physical modifications, damage, abuse, or misuse.**

Anaheim Automation will repair or replace at its' option, any product which has been found to be defective and is within the warranty period, provided that the item is shipped freight prepaid, with previous authorization (RMA#) to Anaheim Automation's plant in Anaheim, California.

TECHNICAL SUPPORT
If you should require technical support or if you have problems using any of the equipment covered by this manual, please read the manual completely to see if it will answer the questions you have. If you need assistance beyond what this manual can provide, contact your Local Distributor where you purchased the unit, or contact the factory direct.

MBC25081
Bipolar Microstep Driver

User's Guide

ANAHEIM AUTOMATION

910 East Orangefair Lane, Anaheim, CA 92801 (714) 992-6990 fax: (714) 992-0471
e-mail: info@anaheimautomation.com website: www.anaheimautomation.com

L010132 January 2013

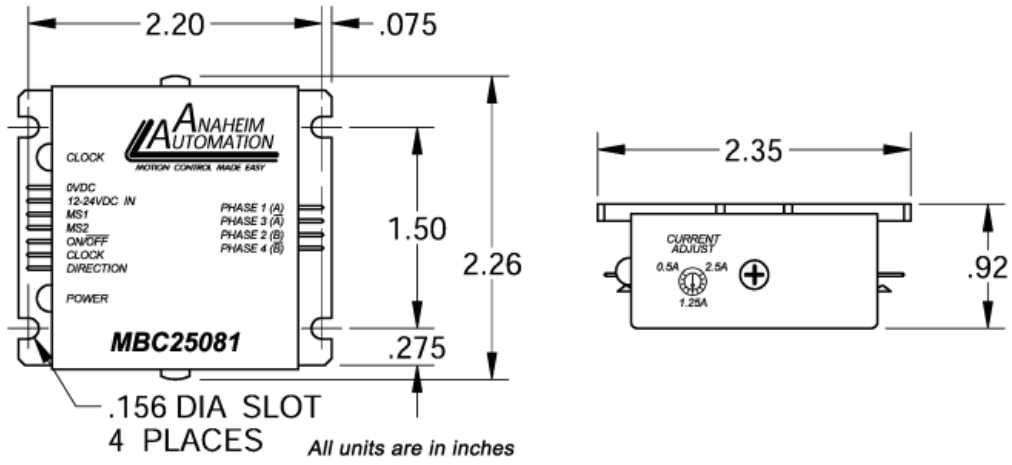
MBC25081 Features

- 2.5 Amps/Phase Output Current
- Bipolar Microstepping Driver Operation
- Over Temperature and Short Circuit Shutdown
- Microstep Divisors of 8, 4, 2, or Full Step
- Compact Package: 2.35” x 2.26” x 0.92”
- 12-24VDC Power Requirement
- Accepts TTL Logic or 24V Level Inputs
- Ideal for Precise Positioning
- Efficient and Durable
- Long Life Expectancy

General Description

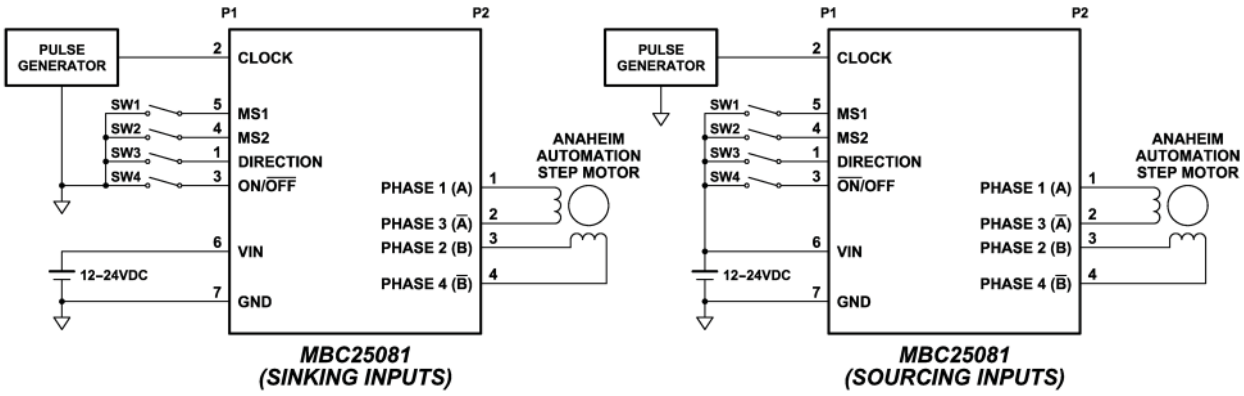
The MBC25081 is a 2.5 amps/phase bipolar microstep driver capable of running four, six, and eight lead step motors. The MBC25081 has an output current range of 0.5 to 2.5 amps/phase and operates off 12VDC minimum to 24VDC maximum. The inputs are capable of running from either open collector or TTL level logic outputs, or sourcing 24VDC outputs from PLCs. The MBC25081 features resolutions from 200 - 1600 steps/revolution, providing smooth rotary operation. The MBC25081 features include built in over temperature and short circuit shut down, automatic 70% reduction in current after clock pulses stop being received, and status LED’s to indicate power on (green LED) and clocks being received (yellow LED). The MBC25081 is a compact, low profile package meant to be used where space is limited but performance is expected.

Dimensions



Ordering Information	
Part Number	Description
MBC25081	12-24VDC, 0.5 - 2.5A Bipolar Microstep Driver, Packaged with Heat Sink
MBC15081	12-24VDC, 0.3 - 1.5A Bipolar Microstep Driver, Open-Frame
CBL-AA4031	7 Pin Input Connector with 12”, 22AWG Leads
CBL-AA4033	4 Pin Motor Connector with 12”, 22AWG Leads
PSAM24V2.7A	24V @ 2.7A Universal Input Power Supply
CON-6404407	7 Pin Connector with 0.100” Centers (Amp #640440-7)
CON-6404404	4 Pin Connector with 0.100” Centers (Amp #640440-4)

Wiring Diagrams



Input Pin Descriptions		
Pin #	Description	CBL-AA4031 Wire Color
1	Direction	Brown
2	Clock	Red
3	On/Off	Orange
4	MS2	Yellow
5	MS1	Green
6	12VDC-24VDC	Blue
7	0VDC (Gnd)	Violet

Input Pin Descriptions		
Pin #	Description	CBL-AA4033 Wire Color
1	Phase A	Brown
2	Phase Ā	Red
3	Phase B	Orange
4	Phase B̄	Yellow

Control Inputs (Pins 1, 2, 3, 4, 5):

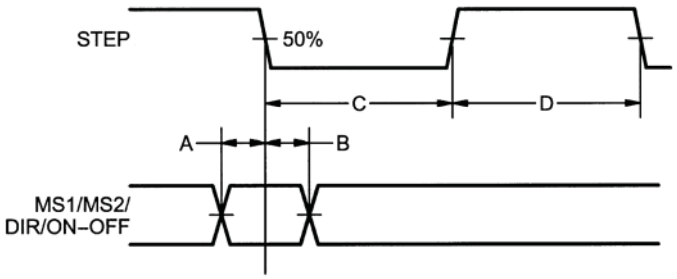
Microstep Resolution Truth Table		
MS1	MS2	Resolution
Active	Active	Full Step
Inactive (Open)	Active	Half Step
Active	Inactive (Open)	Quarter Step
Inactive (Open)	Inactive (Open)	Eighth Step

Direction: Logic “1” CW
Logic “0” CCW

Clock: Active - 1 Step
Inactive (open) - Reduce Current Mode

On/Off: Active - Off
Inactive (open) - On

Notes:
Opens Inputs are inactive and internally pulled up to +5VDC for JP1 position 1-2 (Sinking)
Open Inputs are inactive and internally pulled down to 0VDC for JP1 position 2-3 (sourcing)



A. Minimum Command Active Time Before Clock Pulse (Data Set-Up Time)...200nS
B. Minimum Command Active Time After Clock Pulse (Data Hold Time).....200nS
C. Minimum Clock Pulse Width.....1.0uS
D. Minimum Clock Inactive Time.....1.0uS
Maximum Clock Frequency.....500kHz

With JP1 in position 1-2 (sinking) the inputs are considered inactive of Logic “1” if left open, or active or Logic “0” if grounded. With JP1 in position 2-3 (sourcing) the inputs are considered inactive or Logic “0” if left open, and active or Logic “1” if pulled to 3.5 - 24VDC.

Step Motor Configurations
The output current on the MBC25081 is set by the onboard potentiometer. This potentiometer determines the per phase peak output current of the driver. The relationship between the output current and the potentiometer value is as follows:

WARNING! Step motors will run hot even when configured correctly. Damage may occur to the motor if a higher than specified current is used. Most specified motor currents are maximum values. Care should be taken to not exceed these ratings.

MBC25081 Potentiometer Settings

Peak Current	Potentiometer Setting	Peak Current	Potentiometer Setting
0.50A	0%	1.70A	60%
0.70A	10%	1.90A	70%
0.90A	20%	2.10A	80%
1.10A	30%	2.30A	90%
1.30A	40%	2.50A	100%
1.50A	50%	--	--

Reducing Output Current
Reducing the output current is accomplished automatically and occurs approximately 20mSec after the last of the clock input has been received. The amount of current per phase in the reduction mode is approximately 70% of the set current. When the current reduction circuit is activated, the current reduction resistor is paralleled with the current adjustment potentiometer. This lowers the total resistance value, and thus lowers the per phase output current.

Connecting the Step Motor
Phase 1 and Phase 3 of the step motor are connected to pins 1 and 2 on connector P2. Phase 2 and Phase 4 of the step motor are connected to pins 3 and 4 on connector P2. Please refer to the figure for a typical APPLICATION HOOK-UP.

Note: the physical direction of the motor with respect to the direction input will depend on the connection of the motor windings. To reverse the direction of the motor with respect to the direction input, switch the wires on Phase 1 and Phase 3.

WARNING: DO NOT CONNECT OR DISCONNECT MOTOR WIRES WHILE POWER IS APPLIED!

Motor Selection
The MBC25081 is a Bipolar Microstep Driver that is compatible with both Bipolar and Unipolar Motor Configurations, (i.e. 8 and 4 lead motors, and 6 lead center tapped motors).

Step motors with low current ratings and high inductance will perform better at low speeds, providing higher low-end torque. Motors with high current ratings and low inductance will perform better at higher speeds, providing more high-end torque.

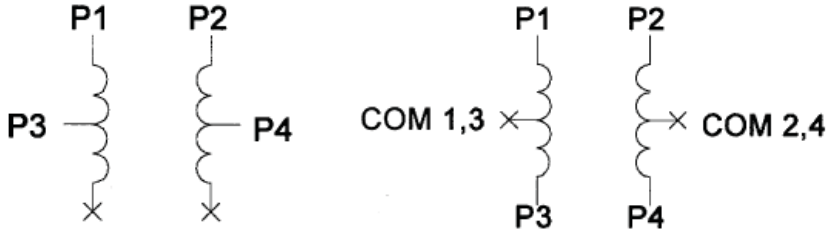
Since the MBC25081 uses a constant current source drive technique, it is not necessary to use a motor that is rated at the same voltage as the supply voltage. What is important is that the potentiometer is set to the appropriate current level based on the motor being used. Higher voltages will cause the current to flow faster through the motor coils. This in turn means higher step rates can be achieved. ***Care should be taken not exceed the maximum voltage of the driver.***

Step Motor Configurations
Step motors can be configured as 4, 6 or 8 leads. Each configuration requires different currents. Refer to the lead configurations and the procedures to determine their output current.

Determining Output Current
The output current for a motor used with a bipolar driver is determined differently from that of a unipolar driver. In the MBC25081, a sine/cosine output function is used in rotating the motor. The output current for a given motor is determined by the motors current rating and the wiring configuration of the motor. There is a current adjustment potentiometer used to set the output current of the MBC25081. This sets the peak output current of the sine/cosine waves. The specified motor current (which is the unipolar value) is multiplied by a factor of 1.0, 1.4, or 2.0 depending on the motor configuration (series, half-coil, or parallel).

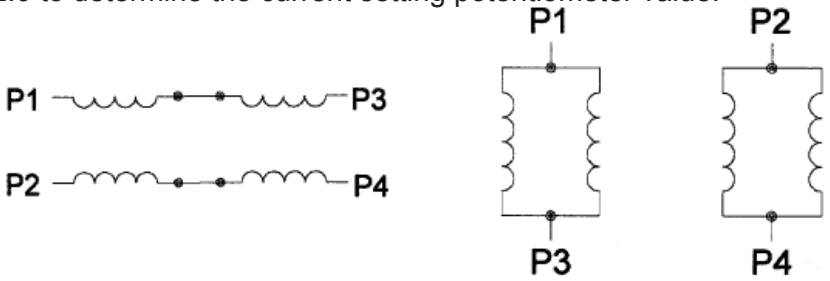
6 Lead Motors
Half-Coil Connection: When configuring a 6 lead motor in half-coil (connected from one end of the coil to the center tap), multiply the specified per Phase (or unipolar) current rating by 1.4 to determine the current setting potentiometer value. This configuration will provide more torque at higher speeds when compared to the series configuration.

Series: When configuring the motor is series (connected from end to end with the center tap floating) use the specified per Phase (or unipolar) current rating to determine the current setting potentiometer value.

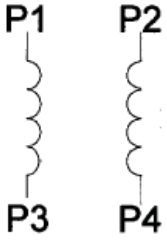


8 Lead Motors
Series Connection: When configuring the motor windings in series, use the per Phase (or unipolar) current rating to determine the current setting potentiometer value.

Parallel Connection: When configuring the motor windings in parallel, multiply the per Phase (or unipolar) current rating by 2.0 to determine the current setting potentiometer value.



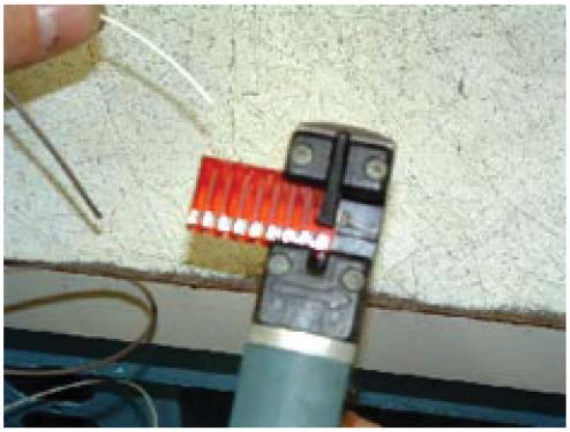
4 Lead Motors
Series Connection: Multiply the specified series motor current by 1.4 to determine the current adjustment potentiometer value. Four Lead Motors are usually rated with their appropriate series current, as opposed to the *Phase Current,* which is the rating for 6 and 8 lead motors.

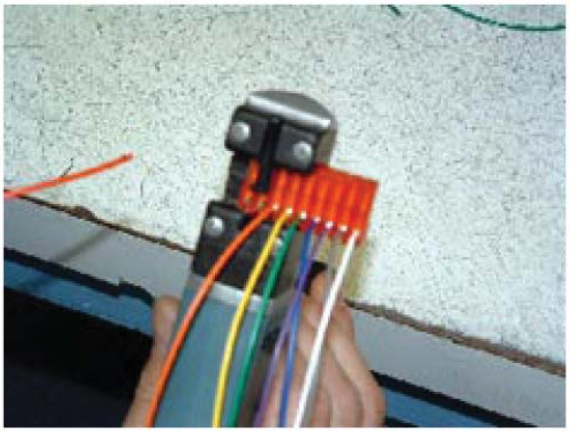


Connecting to the MBC15081

The MBC25081 is designed with cost savings and size as two of the primary design criteria. For this reason, the MTA-100 series connector was chosen for these products as a reliable small and low cost connector. This is a common Insulation Displacement Connector (IDC) manufactured by AMP Corporation. The inputs to the driver are on a 7-pin connector and the motors are on a 4-pin connector. These connectors are not supplied with the driver, but can be purchased from Anaheim Automation or AMP/Tyco Electronics.

These two images show how a hand tool can be used to quickly make the cable to connect to the driver. This cable can be made in approximately 10 seconds per wire using the hand tool.





Tooling from AMP/Tyco Electronics	
Part Number	Description
58074-1	Manual Hand Tool with Interchangeable Head (shown above)
58075-1	Air Hand Tool with Interchangeable Head
58338-1	Air Bench Mount Tool with Interchangeable Head and Foot Switch
58246-1	Die Head for Closed End MTA-100 Connectors (shown above)

Connectors from AMP/Tyco Electronics	
Part Number	Description
640440-7	7 Pin MTA-100 Connector, Closed End with Lock, 22 AWG Red, Tin Plated
640440-4	4 Pin MTA-100 Connector, Closed End with Lock, 22 AWG Red, Tin Plated
640441-7	7 Pin MTA-100 Connector, Closed End with Lock, 24 AWG White, Tin Plate
640441-4	4 Pin MTA-100 Connector, Closed End with Lock, 24 AWG White, Tin Plated
640440-7	7 Pin MTA-100 Connector, Closed End with Lock, 26 AWG Blue, Tin Plated
640442-4	4 Pin MTA-100 Connector, Closed End with Lock, 26 AWG Blue, Tin Plated

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LIMITED WARRANTY
All Anaheim Automation products are warranted against defects in workmanship, materials and construction, when used under Normal Operating Conditions and when used in accordance with specifications. This warranty shall be in effect for a period of twelve months from the date of purchase or eighteen months from the date of manufacture, whichever comes first. **Warranty provisions may be voided if products are subjected to physical modifications, damage, abuse, or misuse.**

Anaheim Automation will repair or replace at its' option, any product which has been found to be defective and is within the warranty period, provided that the item is shipped freight prepaid, with previous authorization (RMA#) to Anaheim Automation's plant in Anaheim, California.

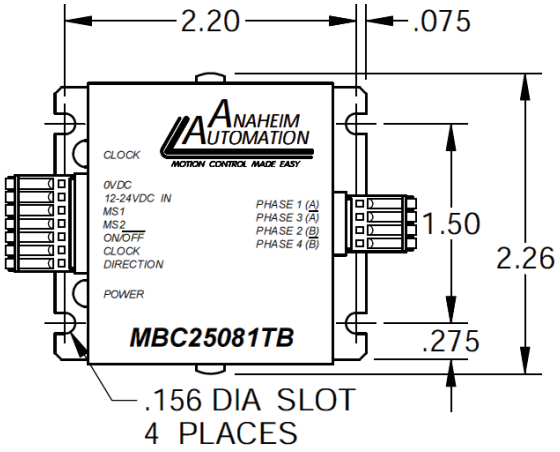
TECHNICAL SUPPORT
If you should require technical support or if you have problems using any of the equipment covered by this manual, please read the manual completely to see if it will answer the questions you have. If you need assistance beyond what this manual can provide, contact your Local Distributor where you purchased the unit, or contact the factory direct.

MBC25081TB - Microstep Driver

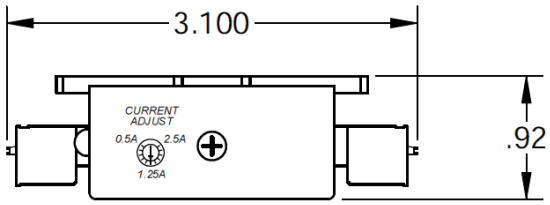
FEATURES

- ***Compact Microstep Driver***
- ***Detachable Terminal Blocks***
- ***0.5 - 2.5 Amp Output Current***
- ***Compatible with Size 8, 11, 14, 17, 23, and 34 Frame Stepper Motors***
- ***24VDC Compatible Input Signals***
- ***Sinking and Sourcing Inputs***
- ***12-24VDC Operating Voltage***
- ***Low Cost - Excellent Value***
- ***Easy to Install***

DIMENSIONS



All units are in inches



DESCRIPTION

The MBC25081TB is a miniature, fully enclosed stepper motor driver perfect for applications where space is limited. With a footprint less than 2.5" square, this microstepping driver provides great performance and flexibility for a driver its size. The MBC25081TB's greatest asset is how easy it is to use. The detachable spring loaded terminal blocks make it simple to install and eliminates the additional connector and cable accessories commonly associated with other compact stepper drivers. You won't need extra "tools" to wire the MBC25081TB.

The MBC25081TB is a bipolar type microstepping driver which can deliver anywhere from 0.5 - 2.5 Amps output current (selectable with a small potentiometer on the side). The driver operates from 12VDC minimum to 24VDC maximum voltage and the inputs are capable of running from either open collector or TTL level logic outputs, or sourcing 24VDC outputs from PLCs, microcontrollers, or any device that outputs step and direction signals.

The driver features microstep resolutions of 200, 400, 800, and 1600 steps/revolution, providing smooth rotary operation. Other features include built in over temperature and short circuit shutdown, automatic current reduction at standstill, and LED's to indicate power on and clock pulses being received. If you lack space but expect performance, the MBC25081TB is the driver for a great option.

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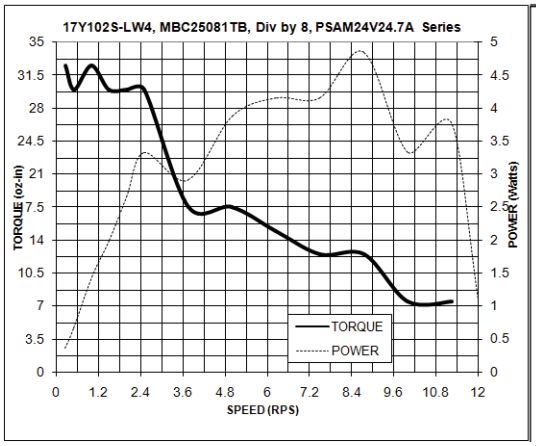
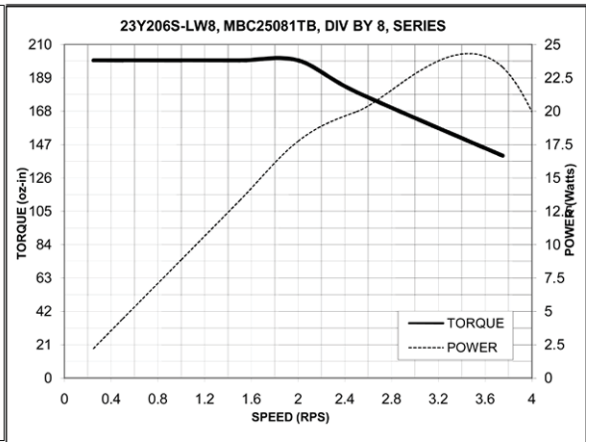
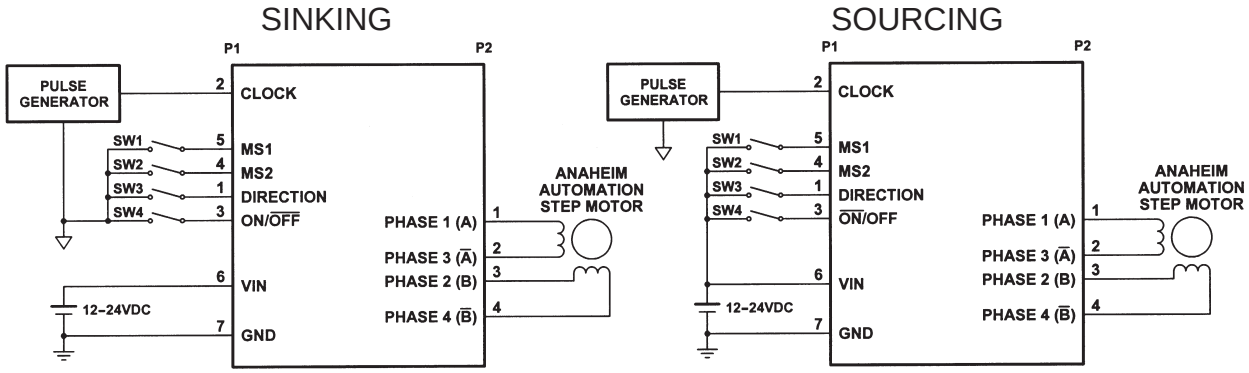
TORQUE CURVES





SPECIFICATIONS



Power Requirements:	12 - 24 VDC	Input Signal Voltage	3.5-24 VDC
Output Current Range:	0.5 - 2.5 Amps (Peak)	Storage Temperature:	0°-50° C
Microstepping Resolution:	200, 400, 800 and 1600 Steps/Revolution	Absolute Maximum Driver Temperature	70°C
Input Clock Frequency:	0 - 500 KHz	Driver Type	Bipolar, Compatible with 4, 6, and 8 Lead Motors. Series or Parallel Connection
Minimum Input Current:	0.5 mA		

Model #	Description	Input Voltage	Power (Watt)
PSAM24V2.7A	24 VDC Power Supply, Up to 2.7 Amp Capability	90 - 265 VAC	65
MBC25081	2.5 Amp Microstepping Driver, Resolutions of 200 - 1600	12 - 24 VDC	-
MBC15081	1.5 Amp Microstepping Driver, Resolutions of 200 - 1600	12 - 24 VDC	-
MBC10081NTB	1.0 Amp Microstepping Driver, Resolutions of 200 - 1600, Non Detachable Terminal Blocks	12 - 24 VDC	-
DPE25601	2.5 Amp Microstepping Driver Package, Resolutions of 200 - 1600	100 - 240 VAC	24

CAT0105

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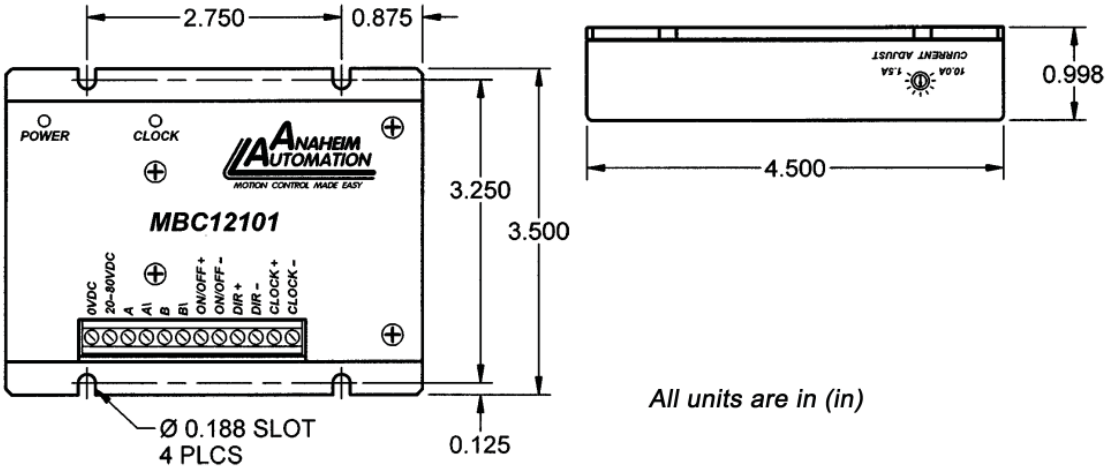
MBC12101 - Microstep Driver

FEATURES

- ***Compact Stepper Motor Driver***
- ***1.5 - 10.0 Amp Current Range***
- ***2000 Steps per Revolution***
- ***Optically Isolated Inputs***
- ***Short Circuit Protection***
- ***20 - 80VDC Bus Voltage***
- ***Automatic Current Reduction***
- ***Sinking and Sourcing Inputs***
- ***Power and Clock LEDs***
- ***CE Certified and RoHS Compliant***

DIMENSIONS



All units are in (in)

DESCRIPTION

If you're looking for big time stepper performance from a small driver, the MBC12101 is your answer. This powerful microstepping driver provides excellent torque in a compact and low profile encloser. The MBC12101 is also very easy to use. It features rugged terminal blocks, a rotary pot for current settings, and a visible silkscreen for easy installation.

Versatile as well as powerful, the MBC12101 has a wide amperage range. It is designed to handle small stepper motors rated as low as 1.5 Amps/phase, mid-sized steppers such as NEMA 23's and 34's, as well as larger motors with current ratings up to 10.0 Amps. It operates from a DC voltage of 20-80 Volts, making it a great fit for almost any stepper application.

The MBC12101 features optically isolated inputs that are 3.5 - 8.6VDC compatible. The clock input can be set to receive either sinking or sourcing clock signals at frequencies up to 100KHz. The driver also features direction control, motor on/off capabilities, and a built in short circuit and miswire shutdown protection.

The MBC12101 is a bipolar type driver designed for use with 4, 6, or 8 lead stepper motors, making it compatible for series and parallel installations. The driver has a 2000 steps per revolution or 0.18° per step resolution,with respect to a 1.8° stepper motor. It also has a motor current reduction feature that will help keep stepper motors cool at standstill, and LEDs that indicate power and pulses being received.

Ideal Applications:
Automated machinery or processes that involve food, cosmetic, or medical packaging, labeling, or tamper-evident requirements, cut-to-length applications, electronic assembly, robotics, factory automation, special filming and project effects, medical diagnostics, inspection and security devices, conveyor and material handling systems, metal fabrication (CNC machinery), pump flow control, XY and rotary tables, equipment upgrades or wherever precise positioning or speed control is required.

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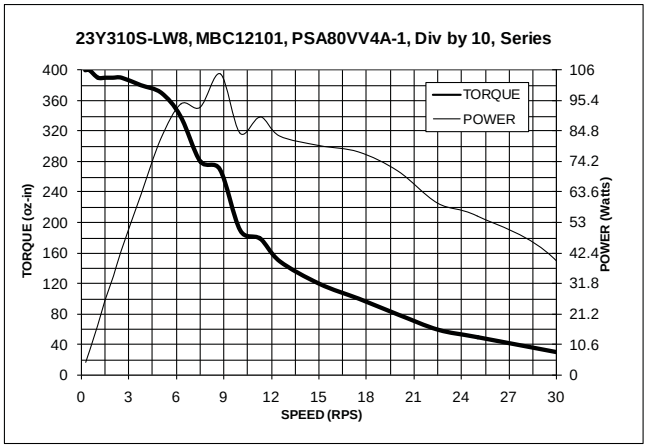
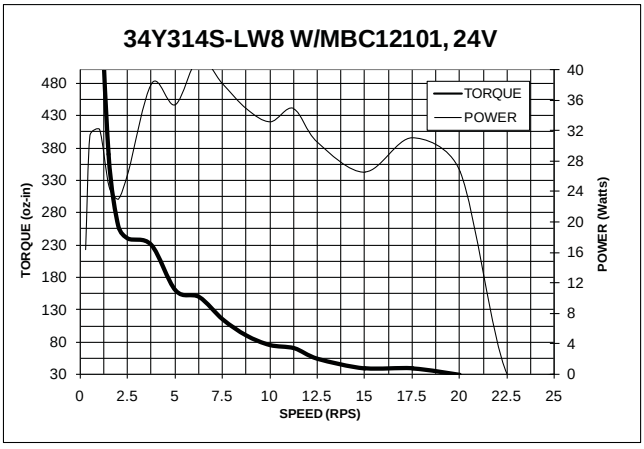
Torque Speed Curves

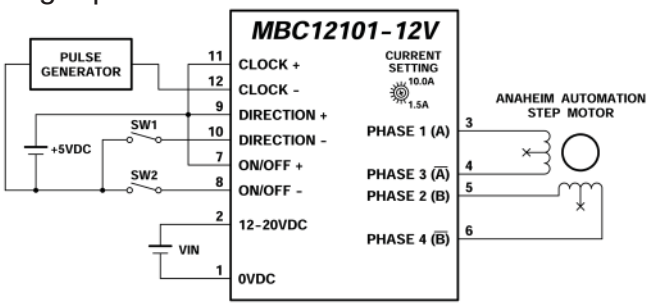




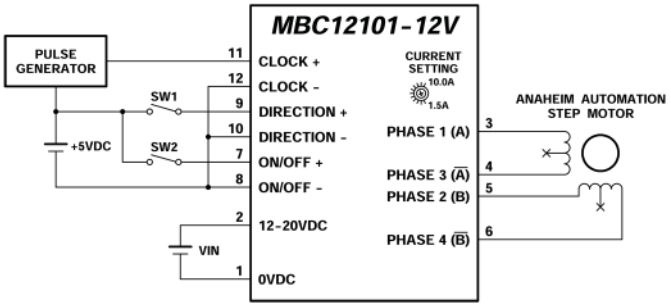
Specifications

Power Requirements:	20 - 80 VDC
Output Current Range:	1.5 - 10.0 Amps (Peak)
Microstepping Resolution:	2000 Steps/Revolution (Div-by-10)
Input Signal Voltage:	3.5 - 8.6 VDC
Input Clock Frequency:	0 - 100 kHz
Minimum Input Current: (Isolated Inputs)	1.0 mA
Storage Temperature:	0° - 50° C
Absolute Maximum Driver Temperature:	70° C
Driver Type:	Bipolar, Compatible with 4, 6, and 8 Lead Motors. Series or Parallel Connection

Sinking Inputs



Sourcing Inputs:



Additional Ordering Information

Model #	Description	Input Voltage	Power (Watt)
PSA80V4A-1	80 VDC Power Supply, Up to 4.0 Amp Capability	110 or 220 VAC	320
PSA40V4A	40 VDC Power Supply, Up to 4.0 Amp Capability	110 or 220 VAC	160
PCL601	Single Axis Simple Programmable Controller, RS232/485 Compatible	24 VDC	-
PCL601USB	Single Axis Simple Programmable Controller, USB Compatible	24 VDC	-
MBC10101-75	Enhanced Performance 10A Microstep Driver	8 - 55 VDC	-
MBC10SI1	MBC10101 with a simple indexer, USB compatible	20 - 80 VDC	-
MBC10P31	MBC10101 with a pulse generator, USB compatible	20 - 80 VDC	-